Naval Command,
Control and Ocean
Surveillance Center RDT&E Division San Diego, CA
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Technical Document 2573
September 1993

Work Plan for the Marine Aerosol Properties and Thermal Imager Performance Trial (MAPTIP)

D. R. Jensen
NCCOSC RDT&E Division

G. de Leeuw
A. M. J. van Eijk
TNO Physics & Electronics Laboratory
The Hague, The Netherlands

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NAVAL COMMAND, CONTROL AND OCEAN SURVEILLANCE CENTER
RDT&E DIVISION
San Diego, California 92152–5001

J. D. FONTANA, CAPT, USN
Commanding Officer

R. T. SHEARER
Executive Director

ADMINISTRATIVE INFORMATION

The work covered in this MAPTIP work plan was performed from January 1993 to September 1993 by the Tropospheric Branch, Code 543 of the Ocean and Atmospheric Sciences Division at NCCOSC RDT&E Division–San Diego. Specifically, this funding was under program element 62435N, RL3C Project RO35E82/01, Marine EO Effects, and by the TNO Physics and Electronics Laboratory in the framework of assignment A92KM615 of the Royal Netherlands Navy. The MAPTIP work was organized by NATO AC/243 PANEL 4/RSG.8 on atmospheric propagation effects on electro-optical systems from 11 October to 5 November 1993.

Released by
R. A. Paulus, Head
Tropospheric Branch

Under authority of
J. H. Richter, Head
Ocean and Atmospheric
Sciences Division

ACKNOWLEDGMENT

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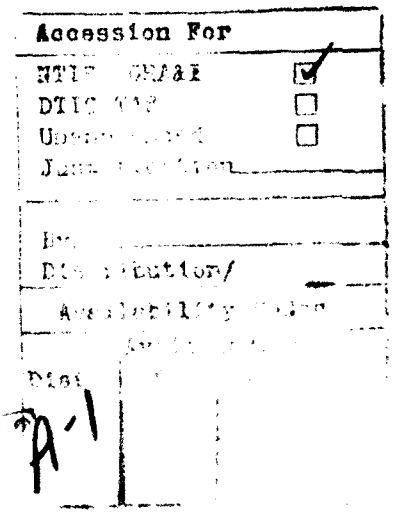

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1.0 INTRODUCTION

1.1 Atmospheric aerosol and infrared sea and terrain background models are of special importance for the assessment of the performance of electro-optical (EO) systems. The degradation of the radiance contrast between a target and its natural background, as viewed by an infrared sensor, is determined by the constituents of the intervening atmosphere that absorb and scatter the radiation. The assessment, therefore, depends upon the accuracy of the atmospheric models being used in the propagation prediction codes. The performance of the electro-optical systems is further degraded by turbulence and refractivity effects, causing blurring, scintillation, beam wander, mirages, etc. In thermal imagers, these effects may result in image distortion, contrast reduction and other detection problems.

1.2 Presently, the Atmospheric Transmission/Radiance computer code, LOWTRAN[1,10], is the primary tool used for this assessment. With the inclusion of the Navy Aerosol Model, NAM[2–9], into LOWTRAN 6[1] and an upgraded version of NAM into LOWTRAN 7[10], users are now able to determine the effects of aerosols on EO propagation in a maritime environment. This model has proven to be a useful tool in predicting atmospheric transmission in the marine atmosphere along horizontal paths at shipboard levels (above 10 m). Another atmospheric aerosol model, NOVAM[11–19] (The Navy Oceanic Vertical Aerosol Model), is being prepared for inclusion into LOWTRAN/MODTRAN and it accounts for the generation, dispersal and removal of the marine aerosols, including transport processes, in the vertical dimension. This model uses NAM as its kernel and is useful for predicting the vertical profiles of extinction from shipboard heights upward through the marine boundary layer. However, to date, the NAM and NOVAM validation has been restricted to a limited range of meteorological situations and geographical locations and must be extended to include coastal regions with substantial continental aerosol inputs. Also, recent studies have shown that NAM/NOVAM in their present forms should not be extrapolated into the region very near the surface (below 10 m) of the ocean for predicting atmospheric properties[20].

1.3 It is important to obtain more detailed information on atmospheric characteristics for the 3–5 and 8–12 micron wavelengths in the first few meters above the surface of the ocean. An effort needs to be undertaken to model the first 10 m above the ocean surface and incorporate it in LOWTRAN for prediction performance of EO systems used for detecting low-altitude targets. During the fall of 1993, a field experiment is planned by NATO AC/243 (Panel 04/RSG.8), with the collaboration from AC/243 (Panel 04/RSG.5), in the Dutch coastal waters to address this very problem. The name of the trial is MAPTIP (Marine Aerosol Properties and Thermal Imager Performance).

1.4 Aerosol and meteorological instruments, as well as thermal imagers and calibrated targets, will be utilized on the Dutch Meetpost Noordwijk (MPN) tower, at a Katwijk Beach Station, the *Hr. Ms. Tydeman* oceanographic vessel, on a Lynx helicopter, on a Dutch P-3 Orion, on the NCCOSC RDT&E Div airborne platform, and on buoy systems. This network of instrumentation will be used for obtaining a comprehensive data base of aerosol size distribution profiles and relevant meteorological variables throughout the marine atmospheric boundary layer. This information is required for the development of the next generation aerosol model ANAM (Advanced Navy Aerosol Model). Emphasis will also be placed on observations close to the ocean surface (below 10 m). Thermal imagery will also be included to provide ground truth for

assessing the ANAM model development for low-level propagation predictions near the ocean surface. To achieve the second goal, measurements will be made of atmospheric turbulence and refractivity effects in the IR and RF bands to assess the marine boundary layer effects on the degradation of thermal images.

2.0 OBJECTIVES

2.1 The main objectives of the MAPTIP trial are to:

2.1.1 Improve and validate vertical marine aerosol models by providing an extensive set of aerosol and meteorological measurements within a coastal environment, at different altitudes and for a range of meteorological conditions. These observations will be used to compare with exist ing models, i.e., NAM, NOVAM, etc., for validation purposes from which newly proposed model improvements can be empirically formulated.

2.1.2 Perform aerosol and meteorological observations within 10 m of the ocean surface with a view to extending existing aerosol models to incorporate near-surface effects.

2.1.3 Assess marine boundary layer effects on thermal imaging systems. Calibrated targets at different altitudes will be observed to the maximum observable range under a wide variety of conditions in both the 3–5 and 8–12 μm bands. These data will be used for the development and validation of IRST models and IR ship signature models. Also, these data will be used for evaluating the 3–5 and 8–12 μm propagation characteristics near the ocean surface and their relationships with marine-generated aerosols, turbulence and meteorological profiles.

2.2 MAPTIP is a NATO AC/243 (Panel 04/RSG.8) "UNCLASSIFIED" field trial for determining the atmospheric propagation effects on electro-optical systems. All systems participating in and the recorded data from MAPTIP must fall within the "UNCLASSIFIED" category.

3.0 SCIENTIFIC COMMITTEE

3.1 A scientific committee to oversee the MAPTIP experiment was formed in the Spring of 1992 at a regular meeting of RSG.8 in France. It consists of representatives from the United Kingdom, Dr. M. H. Smith (University of Manchester Institute of Science and Technology (UMIST)); The Netherlands, Mr. Arie de Jong (TNO Physics and Electronics Laboratory); the United States Navy, Dr. D. R. Jensen (Naval Command, Control and Ocean Surveillance Center) and Mr. D. Crowder (Naval Surface Warfare Center). Dr. G. de Leeuw (TNO Physics and Electronics Laboratory, The Hague, The Netherlands), chairman or RSG.8, and Mr. J. R. Buss (Office of Naval Research, Washington, DC, USA), chairman of RSG.5, will represent the RSG committees on the scientific committee. The main task of the scientific committee is to plan the MAPTIP trial so that all objectives are met, to organize and oversee the planned trial measurements, to organize and coordinate the data analysis, to conduct data analysis workshops, and to direct the preparation of the MAPTIP NATO report. The scientific committee will be chaired by Dr. D. R. Jensen.

4.0 ORGANIZATION COMMITTEE

4.1 The Netherlands, through the TNO Physics and Electronics Laboratory, is hosting the MAPTIP trial. TNO is responsible for the local organization of MAPTIP and all contacts with the local authorities, MPN management, the *Hr. Ms. Tydeman*, the Beach Station, NAS Valkenburg, etc., should be made through TNO. The point of contact is:

Dr. G. de Leeuw
Physics and Electronics Laboratory TNO
Oude Waalsdorperweg 63
2595 AK The Hague
The Netherlands
Tel.: [31] (70) 3264221 (Wk)
[31] (20) 6963573 (Hm)
Fax.: [31] (70) 3280961
Email: glen1.feltno@fel.tno.nl

5.0 LOCATION

5.1 The MAPTIP trial will be conducted in the Dutch coastal waters near The Hague, The Netherlands. Several operational platforms will be available for scientific data collection:

5.1.1 The "Meetpost Noordwijk" (MPN) oceanographic tower (owned by the Dutch Department of Harbors and Public Works "Rijkswaterstaat") situated at approximately 4.9 Nmi from the Dutch coast near the village of Katwijk (52°16′25.9″N, 04°17′45.8″E).

5.1.2 A beach station located at the south end of the boulevard of Katwijk, 5.6 Nmi from MPN (52°11′51.6″N, 04°22′57.6″E).

5.1.3 The Dutch ship *Hr. Ms. Tydeman.*

5.1.4 A LYNX helicopter and a P-3 Orion.

5.1.5 The NCCOSC airborne platform.

5.1.6 Several buoy systems will be available for near surface observations.

5.2 The MAPTIP trial operations will be conducted within a 27 Nmi radius of MPN. Appendix A contains detailed information on the MPN tower, Katwijk Beach Station, and the *Hr. Ms. Tydeman*. Space assignments for each platform are also indicated in Appendix A.

6.0 EXPERIMENT OUTLINE

6.1 BASIC INFORMATION

6.1.1 The time frame for the MAPTIP trial is 11 October to 05 November 1993 (weeks 41–44). Equipment installation will commence on the 11th and must be completed by the 15th. The operational period will begin on the 18th. All MPN personnel will return to The Hague for the weekend of 16 and 17 October. Operations will be conducted through 03 November. Equipment removal from MPN and the Beach Station will commence on the 4th and everything must be packed and ready for shipment by 1000 hours, 5 November 1993. If adverse weather conditions exist on the 4th and the 5th, equipment removal may be delayed. All personnel will, however, be returned via helicopter to the mainland on the 5th and the delayed shipping will be taken care of by TNO.

6.1.2 A procedural outline for accomplishing the MAPTIP objectives was formulated at the last RSG.8 meeting in France, May 1992. Aerosol and meteorological instruments, as well as thermal imagers and calibrated targets, will be located on the oceanographic tower, Meetpost Noordwijk (MPN), 4.9 Nmi off the Dutch coast. Thermal imagers will also be located on the beach at the Katwijk Beach Station. A dedicated oceanographic vessel, *Hr. Ms. Tydeman*, will operate in the vicinity of the tower (at distances up to 27 Nmi) and on a radial between the MPN tower and the Katwijk Beach Station. A Lynx helicopter will be utilized for the deployment of thermal imagers, calibrated targets, and itself also being an IR target. A FLIR equipped Orion P-3 will be used to image the *Hr. Ms. Tydeman* and to determine detection and identification ranges. Airborne aerosol and meteorological measurements will be made utilizing the NCCOSC RDT&E Div airborne platform to document the horizontal and vertical profiles of aerosol extinction and meteorological conditions during the experiment. Calibrated IR targets will be located at different levels on the *Hr. Ms. Tydeman* and will be observed either from the shore or the tower to determine the 3–5 and 8–12 micron IR transmission properties near the ocean surface. Calibrated IR targets will also be used for an IR transmission path between MPN and Katwijk. A comparative 3–5 and 8–12 μm transmissometer will mounted at Katwijk for determining the ratio of the simultaneous 3–5 and 8–12 μm transmissions from MPN.

6.1.3 Aerosol size distributions will be measured as a function of distance from the ocean surface together with air mass (radon, carbon, CN, etc.), wind speed and direction, relative humidity (for aerosol growth), sea surface temperature, and 0.53 and 10.6 μm extinction (used for scaling of smaller and larger aerosols, respectively). Possible additional parameters to be measured for the development of the Advanced Navy Aerosol Model (ANAM) include wave height and wave/wind direction differences, sea surface temperature, pressure, rain rate, solar irradiation, and cloud cover.

6.1.4 Given the above meteorological information and the aerosol size distribution (either measured or modeled), MIE calculations can be made to determine the extinction at a particular wavelength for a given particle index of refraction. The total propagation extinction is then the sum of the molecular part plus that due to the aerosols themselves. The molecular part can be accurately determined from LOWTRAN and added to that determined using the aerosol model.

6.1.5 The effects of turbulence will be determined from micrometeorological measurements using the dissipation packages on the buoys and on the tower. Both covariance and dissipation

methods will be used to determine the relevant parameters (u*, t*, and q*) from which optical effects can be assessed through the relations with the structure function parameter $C_n^2(z)$ and the point spread function (PSF).

6.1.6 Refractivity effects can be determined through the meteorological profiles and, using similarity theory, from point measurement of meteorological parameters, to determine duct heights. The validity of the latter method, in non-steady state conditions and in the presence of waves, is one of the questions that should be addressed. Air and sea surface temperatures (AT and SST, respectively) will be continuously recorded at MPN for determining the air to sea $\Delta T(C)$, i.e., $\Delta T = AT-SST$. Operational periods will be scheduled to maximize the possibility of +/– ΔT's. The RF and IR propagation measurements (reference 6.1.2), between the MPN and the beach station, yield direct information on the refractivity effects.

6.2 PLATFORM MANAGERS

6.2.1 A manager will be selected for each of the major platforms. The manager may, or may not, be a member of the scientific committee. His responsibilities will be to coordinate all instrumentation installations and measurements for his platform. All communications with the scientific committee will be through him. Pre- and post-operational briefings will be the responsibility of and conducted by, the manager. The platform manager is the representative to the scientific committee for that platform. The assigned managers are as follows:

A. MPN: Dr. A. M. J. van Eijk

B. Lynx Helicopter and Orion P-3: Dr. P. B. W. Schwering

C. *Hr. Ms. Tydeman*: Dr. F. P. Neele

D. Beach Station and General Point of Contact: Dr. G. de Leeuw

E. NCCOSC Airborne Platform: Dr. D. R. Jensen

6.3 INSTRUMENTATION CALIBRATION

6.3.1 Each participating group will be responsible for the preparation and calibration of its equipment. During the instrumentation setup at MPN, an intercomparison of the aerosol spectrometers, including the rotorods, will be made by co-locating the instruments and making a 24-hour comparison. On a daily basis, all aerosol spectrometers at MPN will be run simultaneously at the same elevation to determine if any basic system failure has occurred (system operational consistency). The airborne aerosol spectrometer data will be compared with the MPN data by a fly-by during the data collecting period. All shore-based spectrometers will be compared prior to the experiment at TNO.

6.4 SYNCHRONIZATION

6.4.1 All participating platforms should be synchronized to GPS (GMT) time. The precision required is on the order of one minute. This should be sufficient for the atmospheric phenomena under study.

6.5 DAILY OPERATION

6.5.1 The daily operational procedure is summarized in Appendix B. Each day will consist of a nine to ten hour high intensity data collecting period, that is conducted either during early

morning (before sun up) daytime, or late evening (after sundown) hours. The operational times will be held as close to the schedule as possible. However, exact time scheduling for these periods will be determined on the day before and after forecasts from the NAS Valkenburg regional weather facility have been reviewed by members of the shore based scientific committee. This will allow operational periods to be scheduled around any special weather phenomena or frontal activity that may be occurring within the area. Planned operational times will be telephoned or radioed to each principle platform via the platform manager, i.e., the Katwijk Beach Station, MPN, *Hr. Ms. Tydeman*, Lynx helicopter, Orion P3, and the NCCOSC aircraft, by the TNO representative on the committee. The platform manager will be responsible for communicating all pertinent information to the platform participants.

6.5.2 Prior to the commencement of the daily operational period, an updated forecast will be obtained from the NAS Valkenburg weather facility and reviewed by the scientific committee. The planned daily schedule will then be confirmed, or modified, as per the updated forecast. This schedule will then be communicated by telephone or radio to all platform managers. Late changes in the daily plans will, hopefully, be held to a minimum. Only those changes necessary to meet the objectives of the MAPTIP trial will be made.

6.5.3 During the intense data period, aerosol profiling will be taken on the MPN tower and IR imaging will be conducted from the Katwijk Beach Station, the MPN tower, and the Lynx helicopter. The IR imagers will utilize the calibrated sources on the *Hr. Ms. Tydeman* and the Lynx helicopter. The NCCOSC airborne platform will be used to profile the aerosol and meteorological conditions, i.e., vertical and horizontal profiles of air temperature, relative humidity, sea surface temperature, aerosols, etc., within the vicinity of the platforms and fly as a target for the IR imaging systems. The time coordinated geographic location of the *Hr. Ms. Tydeman*, the Lynx helicopter, and the NCCOSC airborne platform will be accomplished using GPS navigation.

6.5.4 To obtain a complete meteorological history for each event, all meteorological support measurements are to be taken (recorded) 24 hours per day. During daylight hours, hourly observations should be manually taken and recorded in logs at each principle site for after-the-fact data verification; i.e., measurements of air temperature, relative humidity, winds, visibility, sea state, etc. All pertinent information necessary for reconstructing the operational scenario should be recorded. This responsibility will reside with the appointed platform manager (reference section 6.8). A VHS video camera will be operated at MPN during each event to provide a visual picture of the operation weather conditions and sea states.

6.5.5 The scientific committee will coordinate the MAPTIP trial through TNO as per the work plan, i.e., communications (tower, ship, beach, aircraft, etc.) and the operational scheduling (ship and flight schedules of the *Hr. Ms. Tydeman*, the Lynx helicopter, the Orion P-3, and the NCCOSC aircraft). Modifications to the plan may result after consultation with individual platforms, the NAS Valkenburg weather forecaster's office and the airport authorities.

6.5.6 After the scientific committee has reviewed the weather forecast and established a daily operational time schedule, each platform manager will hold a pre-event briefing. This briefing will cover previous operational difficulties, measurement results from the previous event, the objectives and operating mode for the upcoming event, and the status of the equipment. Equipment calibration should be scheduled so as not to interfere with the planned trial. At the conclusion of the daily trials, a post briefing is in order. Objectives for the daily post briefings are to

review the operational procedures, identify the objectives that were met, ensure that all logs were successfully completed, and initiate the plan for the next operating period.

6.5.7 All official weather observation stations within the vicinity of the Dutch coast report to NAS Valkenburg. It has been requested that all of this data, including satellite data, be made available on a daily basis, in either PC compatible ASCII, or printed format. This is to be picked up daily by the shore-based MAPTIP scientific committee representative.

6.5.8 During each trial, all instrumentation should be operated and every effort made to insure that the majority of the instrumentation is operational.

6.5.9 The *Hr. Ms. Tydeman* will make runs on six radials (Reference Appendix B): 1) between the Katwijk Beach Station (way point B) and a point 10 Nmi on a 156° true radial from the Beach Station (way point A); 2) between way point A and the MPN tower (way point MPN); 3) between MPN and the Beach Station; 4) between MPN and a point 10 Nmi on a 250° true radial from MPN (way point C); 5) between way point B (Katwijk Beach Station) and way point C; and 6) between way point C and way point A. On the radials between way points A and MPN, MPN and B, and between MPN and C, at distances of 1, 3, 5, 7, and 10 Nmi (referenced to MPN), the *Hr. Ms. Tydeman* will turn a small circle to allow for broadside and stern thermal imaging. The *Hr. Ms. Tydeman* will make long and short treks across the North Sea as noted in Table B1. This will allow an investigation of the spatial variability of aerosol and other environmental parameters, along and across the wind, at different ranges from the coast. During evenings and nights, when the ship is not being used as a IR target, it may either be anchored at MPN, free for requested operations, or making environmental observations at 27–54 Nmi upwind from MPN (Appendix B).

6.5.10 The Lynx helicopter is equipped with a FLIR and will make support runs with the *Hr. Ms. Tydeman*. On the radials as per 6.5.9, it will circle the *Hr. Ms. Tydeman* at a radius of approximately 0.5–1 Nmi at an altitude of 400 ft for all aspects of thermal imaging. It will be equipped with a calibrated IR target (suspended below) for IR imaging and is itself (exhaust wise) a hot target. At ranges of 1, 3, 5, 7, and 10 Nmi (referenced to MPN) on the described radials the Lynx will hold for 2 minutes for transmission and imaging measurements. Runs will also be made on the 280° and 330° (true) radials from the Beach Station to 12.8 Nmi and 20.5 Nmi, respectively. The FLIR will also be used to determine detection/identification ranges.

6.5.11 A FLIR equipped Orion P-3 is being provided by NAS Valkenburg and will be used to determine detection/identification ranges for the *Hr. Ms. Tydeman* during the operation (planned between way points C and A).

6.5.12 Lidars are to be normally operated in the horizontal mode but shifted vertically every hour. During intense data periods, however, they are to be shifted vertically every half hour.

6.6 COMMUNICATIONS

6.6.1 Appendix C contains a copy of the U.S. Navy's official request and the approval for dedicated MAPTIP communication frequencies. Requests for frequencies in both the VHF civilian and military bands, as well as the military UHF band, were made and have been approved. The VHF military frequencies approved include 142.050, 142.075, 142.800, and 143.65 MHz, and 283.825 MHz for the military UHF band. A dedicated VHF civilian frequency of 126.675 has

been assigned. Portable transceivers, operating in the military VHF bands, will be supplied by the U.S. Navy for each platform (two for each station, a primary and a backup). VHF civilian transceivers are available on the *Hr. Ms. Tydeman*, Lynx, P3, and the NCCOSC airborne platform. The U.S. Navy will make additional VHF civilian transceivers available for MPN and the Beach Station. UHF equipment is available on the *Hr. Ms. Tydeman*, Lynx, P3 and the NCCOSC airborne platform. TNO will try to obtain UHF equipment for MPN and the Beach Station. All platforms will, therefore, have VHF civilian, VHF military, or UHF (UHF possibly available at MPN and the Beach Station) for interstation communication. All platforms will be assigned frequencies in these bands for interstation communication. This will tie every platform together by VHF civilian, or military frequencies, and possibly UHF military. Cellular telephones will also be considered for communication. A radio communication officer on the *Hr. Ms. Tydeman* will be responsible for coordinating all the communication traffic between platforms. To reduce the amount of interference from the communications equipment, an attempt will be made to minimize rf transmissions (at least regarding transmissions from the MPN and Beach Station platforms) during the high intensity measurement phases. Run geometries and time lines will be established for each platform to minimize continued coordination communications. TNO will provide sound phones for MPN for interplatform communications.

6.7 SAFETY REQUIREMENTS

6.7.1 There are no official regulations in Holland for laser safety. It will therefore be the responsibility of each participant utilizing laser technology to assure that proper safety procedures be adhered to. All laser operations should comply to the rules and safety standards as per the country sponsoring the laser system.

6.7.2 All participants should check with their own insurance companies concerning proper procedures in case of an emergency while participating in MAPTIP; i.e., foreign country coverage, operation on the MPN tower, the ship, the beach stations, etc

6.7.3 A central phone number will be distributed by TNO to MAPTIP participants to which emergency phone calls (hopefully none) can be directed.

6.7.4 Those who work on MPN will want to have special survival clothing as directed by TNO. TNO will not be able to provide this equipment.

6.8 DATA LOGS

6.8.1 Each participant will maintain a complete instrumentation log, including a time-line log, for the duration of the MAPTIP operation. These logs will contain information on instrumentation calibration, operational times, summary of events, and all pertinent information necessary for the evaluation of, and if necessary, the reconstruction of all information required for the analysis of the data. These logs are to be reviewed by the platform manager on a daily basis at the post briefing and copies of them are to be collected and compiled for the platform. At the completion of MAPTIP, a copying machine will be provided for making copies for distribution of the logs to all participating groups.

6.8.2 An example of the proposed "MAPTIP Participant Daily Log" is in Appendix D. This log is intended to document the daily operational parameters for each individual sensor system

and show the times of operation. In Appendix E an example of the "MAPTIP Platform Quick Look Daily Log" that is intended to summarize the Participant Daily Log for each platform and show an overall time line for all instrumentation is shown.

7.0 INSTRUMENTATION SUMMARY

7.1 RSG.8

7.1.1 CANADA

Canada's participation in MAPTIP is as follows:

A. DREV will provide one visible (HSS VR-301 Forward Scatter Meter) and one 10.6 micron (PVM-300 Forward Scattering Probe) extinction meter. One person will install, maintain, and operate the sensors and their data acquisition system for the duration of the experiment on the MPN tower.

B. DREV also plans an imaging experiment (refractive effects) utilizing a visible camera and a 3–5 micron thermal imager. This equipment will be located at the beach station. The scenario is to view point targets positioned at different heights on MPN and on the *Hr. Ms. Tydeman*. It would also be of interest to have the ship sail away from the beach to distances beyond the geometrical horizon. DREV would supply the visible sources. A total of 2–4 people would man this experiment, all from the beach station, except for mounting the sources on the platform and the *Hr. Ms. Tydeman*.

A total of 3 to 5 individuals (MPN and Beach Station) will man the total experiment. The point of contact for these equipments, their operation, and the related data analysis is:

Dr. Luc R. Bissonnette
Defence Research Establishment Valcartier
2459, Pie XI Blvd., North (P.O. Box 8800)
Canada
Tel.: (418) 844–4437
Fax.: (418) 844–4511
Email: lbisson@sv0.drev.dnd.ca

7.1.2 DENMARK

DDRE will participate in MAPTIP by providing two IR imagers, the AMBER AE4128 (3–5 microns) and the AN/TAS 4b (8–14 microns).

A. AMBER AE4128

a. Detector: InSb, PV 128 × 128 array

b. Detector pitch: 50 × 50 μm

c. Spectral band: 3–5 μm

d. FOV (500 mm optics): 0.7 deg(V) × 0.7 deg(H)

e. IFOV: ≅ 0.05 mradians (with 500 mm telescope objective)

f. NETD: 0.01°C

g. Scan type: 2 Dim Array

h. Frame rate: ≤ 215 frames/sec

i. Frame format: 128V × 128H pixels

j. ADC: 12 bits

k. Continuous recording: ≤ 256 frames

B. AN/TAS 4b

a. Detector: MCT, PC 60 × 1 array

b. Spectral band: 8–14 μm

c. FOV: 0.6 deg(V) × 1.4 deg(H) (WFOV: 1.8 deg × 4.3 deg)

d. IFOV: 0.2 mradians (WFOV: 0.6 mradians)

e. NETD: 0.05°C

f. Scan type: Array (ver), mech., forw./backw. interlaced (H)

g. Frame rate: 25 frames/sec (50/2)

h. Frame format: 56 × 2 lines, recorded as 128V × 256H pixels; 32 × 2 lines, recorded as 64V × 512H pixels

i. ADC: 12 bits, 2 MHz (or 1 MHz)

j. Continuous recording: ≤ 128 frames

Recording equipment will be provided for the imagers. The primary task will be to study turbulence degradation of thermal imaging over a long sea path.

The location for the imagers will be on the MPN tower and will require two people. Point of contact is:

Mr. O. G. Nielsen
Danish Defense Research Establishment
Ryvangs Alle 1
P.O. Box 2715
DK 2100 Copenhagen
Denmark
Tel.: [45] 3027 2233
Fax.: [45] 3120 3315
Email: (Not Available)

7.1.3 FRANCE

The French Navy (CESDA from DCN/Toulon) and CELAR will participate in MAPTIP with the following equipment:

A. Knollenberg Spectrometers, a CSASP-100-HV (0.5 to 47 microns) and an ASASP-X (0.09 to 3 microns). Data is processed via the PMS Particle Data System PDS300.

B. Buoy Systems

C. Sea State Information

D. Satellite SST

E. Visibility Meter (HSS VR-301-B-120). Gives extinction coefficient at 0.55 μm from local scattering measurements (sampling volume 3000 cc).

The environmental parameters recorded on the buoy during the trial will include air temperature, relative humidity, pressure, sea surface temperature (–30 cm), wind speed and direction, solar irradiation, wave height and periods, and satellite SST (at night). Personnel will include 2 from DCN/Toulon (DESDA) and 2 from CELAR. Point of contact is:

Mr. Alain Junchat
CELAR
Centre d'Electronique de l'Armement Division ASRE
35170 Bruz
France
Tel.: [33] (99) 42 91 65
Fax.: [33] (99) 42 90 94
Email: (Not Available)

7.1.4 GERMANY

The German MAPTIP contribution for the beach station will consist of:

A. Three wavelength mobile aerosol lidar for wavelengths of 1064 nm, 532 nm and 355 nm.

a. Range: 0.3 km to > 15 km

b. Range resolution: ≤ 15 m (532 nm and 355 nm), ≤ 30 m (1064 nm). Resolution can be improved by using a 100-MHz storage oscilloscope.

c. The laser-receiver can be tilted and rotated around a vertical axis.

B. Mobile aerosol lidar (eye-safe) operating at 1.56 microns wavelength.

a. Range: 0.3 km to > 15 km

b. Range resolution: 15 m

c. Lidar can be tilted to > 35 degrees

C. Two-wavelength White-Cell transmissometer for point extinction measurements at 543 nm and 1.56 microns.

a. Path length: 70 m

b. Minimum discernible extinction coefficient: 0.014/km (met. range 363 km)

c. Reliable operation for dry aerosol only.

D. Visibility meter (AEG)

E. Dual waveband thermal imager (DUWIR). The system simultaneously records thermal images in the 3–5 and 8–12 micron band. Its field of view amounts to 3 deg × 2 deg.

F. IRC-64 Staring Array Camera. This camera is equipped with an Indium Antimonide (InSb) focal plane array and provides a 64 pixel by 64 pixel image. Due to a spectral filter the system is sensitive in the 4.5 to 4.7 micron region. The IRC-64's field of view is 2.2 × 2.2 degrees.

G. Infrared Spectral Radiometer. The intensity of radiation emitted by the sky background is measured within the 2.5 to 8 micron wavelength region. The field of view of the radiometer is a circular field of 0.42 degrees.

H. Extended blackbodies. Two temperature-controlled sources will be placed close to the camera systems for the purpose of calibration.

I. Standard Meteorology Station (temperature, relative humidity, pressure, wind speed and direction, up/down welling radiance, and visibility).

J. Calibrated Point-like Target will be provided for the MPN tower. Its temperature can be varied up to 300°C.

A total of 6–7 personnel will be required for the beach station. The point of contact for the FGAN-FfO experiments, their operation, and related analysis is:

Dr. K. Stein
Forschungsinstitut fuer Optik (FfO)
Schloss Kressbach
D-7400 Tuebingen
Germany
Tel.: [49] 7071 709 179
Fax.: [49] 7071 709 270
Email: (Not Available)

7.1.5 THE NETHERLANDS

The Netherlands, through TNO Physics and Electronics Laboratory, is the host for the MAPTIP trial. TNO is responsible for all the local arrangements and has made arrangements for the use of the MPN tower, the *Hr. Ms. Tydeman*, and the Lynx helicopter during MAPTIP.

TNO instrumentation for MPN includes:

A. Boom-operated instrumentation platform. The platform can be used for profiling by altering its height, from 1–2 m above the wave tops to about 10 m. When not being used for profiling, the boom will be set at 3–4 m above the wave tops. Boom platform instrumentation includes:

a. An optical particle counter (CSASP-100, 0.2–20 μm diameter, 1 range in 31 channels).

b. A turbulence package consisting of a Solent (Gill (SIC)) sonic anemometer (3-D winds and temperature spectra) and a OPHIR IR hygrometer or CO_2/H_2O spectrometer.

c. A Rotronic hygrometer for mean air temperature and relative humidity.

B. Three to four Rotronic sensors, mounted on the outside of MPN at different levels, for continuous profiling of air temperature and relative humidity.

C. A Rotorod aerosol sampler, Rotronic sensor (for air temperature and relative humidity) and a buoy system (to obtain bubble spectra) will be mounted on the outrigger assembly located on the Northwest platform of MPN.

D. On the MPN decks, there will be mounted a lidar for boundary layer profiling, an optical aerosol particle counter (CSASP-100HV), and a point visibility meter (AEG), or nephelometer.

E. Local meteorological observations at MPN are available from the North Sea monitoring network (obtained through NAS Valkenburg).

TNO instrumentation for the *Hr. Ms. Tydeman* includes:

A. Radiosondes (taken every 6 hours).

B. Optical aerosol particle counters: the ASAS-300A (0.16–3.0 μm diameter), and the CSAS-100HV (0.5–32 μm diameter).

C. Impactor for chemical analysis (cooperative effort with the University of Antwerp).

Air-mass trajectories will be requested by TNO for the operational period. They will be used for identifying the existing air-mass types for each of the operational periods.

A total of 5 personnel (3 at MPN, 1 at the beach site, and 1 on the *Hr. Ms. Tydeman*) will be required for the TNO operation. The point of contact will be:

Dr. G. de Leeuw
Physics and Electronics Laboratory TNO
Oude Waalsdorperweg 63
2509 JG The Hague
The Netherlands
Tel.: [31] (70) 3264221
Fax.: [31] (70) 3280961
Email: glen1.feltno@fel.tno.nl

7.1.6 NORWAY

Norway (NDRE) will participate with two IR imagers, one laser rangefinder and three calibrated sources. A summary of the equipment is as follows:

A. Two UK (Rank Taylor Hobson) Thermal Imaging Common Modules Class II (TICM-II) cameras, one operating in the wavelength band of 3–5 μm and the other at 8–12 μm.

a. Detectors: 8 elements SPRITE CMT

b. Field of view: 8 deg (vertical) by 12 deg (horizontal).

c. Spatial resolution: 0.5 mrad
d. No. of TV lines: 512
e. NETD (3–5 μm): 0.5 K
f. NETC (8–12 μm): 0.2 K
g. Video format: 625 lines, 50 Hz, 2:1 interlaced

B. Two HGH (French) calibrated sources.
a. Emissive area: 300 × 300 mm
b. Emissivity: 0.99
c. Temperature setting: Ambient to 300°C
d. Thermal uniformity: < 0.5°C @ 100°C all over the area.
e. Accuracy: ±0.5°C
f. Power supply: 220 VAC, 50 Hz, 2.4 Kw

C. One AGA (Sweden) calibrated source.
a. Emissive area: 100 mm diameter
b. Emissivity: 0.96
c. Temperature setting: 16° to 100°C
d. Accuracy: ±0.2°C
e. Power supply: 220 VAC, 50 Hz, 90 w

D. Laser rangefinder (Simrad Optronics)
a. Laser wavelength: 1.06 μm
b. Emitted power: 1.5 Mw
c. Pulse duration: 30 ns
d. Beamwidth: 1 mrad
e. Available optical transmission filters: 10% & 20%
f. Minimum distance: 200 m
g. Maximum distance 19995 m
h. Distance resolution: 5 m
i. Uncertainty: ± 10 m

A total of 2 personnel will be required at the beach station. The point of contact is:

Dr. E. Bingen
Norwegian Defence Research Establishment
Box 25
2007 Kyeller
Norway
Tel.: [31] (70) 3264221
Fax.: [31] (70) 3280961
Email: (Not Available)

7.1.7 UNITED KINGDOM

The United Kingdom (UMIST) plans on providing the following equipment for installation on the MPN tower:

A. A sea spray package which consists of an FSSP-100 and an OAP-230X aerosol probe covering the particle radius range from 0.25 to 150 microns.

B. A ASASP-X, for particles with radii from 0.05 to 1.5 microns, that will be operated with a volatility system to determine aerosol composition.

C. An aethalometer to provide soot carbon loadings.

D. Radon counter (used only as a back-up instrument for the primary system).

E. A 'dissipation' package consisting of a Solent (Gill (SIC)) ultrasonic anemometer and Ophir infrared hygrometer.

F. A VHS video camera for recording weather conditions and sea states (UK/European standard format). The expense of converting to other formats will be each participant's responsibility.

A total of 2 individuals will man the MPN experiment. The point of contact for these equipments, their operation and the related data analysis is:

Dr. M. H. Smith
University of Manchester Institute of Science and Technology
Physics Department
P.O. Box 88
Manchester M60 1QD
United Kingdom
Tel.: [44] (61) 200 3933
Fax.: [44] (61) 200 3941
Email: michael.smith@mailhost.mcc.ac.uk

7.1.8 UNITED STATES (NAVY)

The U.S. Navy plans to participate with the following equipment:

A. Two Particle Measuring Systems Inc. ASSP-100 aerosol spectrometers (0.5–30 μm diameter). MPN mounted for profiling aerosols near the ocean surface.

B. An ANGVS/5 lidar (Lidar profiling on MPN).

C. Rotorod (Model MP-100) air temperature and relative humidity probe (surface aerosols at MPN).

D. NCCOSC Airborne Platform:

a. Particle Measuring Systems Inc. FSSP-100 (0.5–47 μm) and OAP-200 (30–300 μm) aerosol spectrometers

b. IR sea surface temperature (Everest Model 4000LCS)

c. Vertical and horizontal profiles of air temperature (Rosemount Model 102AU1AF), relative humidity (EG&G Dew Point Hygrometer Model 137-SP-F), sea surface temperatures (Everest Model 4000LCS), and pressure (Rosemount Model 542K2 Alt/Sp Transducer).

E. Radon Counter (OMS ARC2A)

F. CN Counter (Environment One Corp. Model Rich-200)

G. Wave height/period measurement at MPN (Lundal DCU-7 Ultrasonic Ranger).

H. IR sea surface temperature (Everest Model 4000LCS) at MPN (continuous).

I. A Comparative 3–5 and 8–12 μm Transmissometer. A wide band, wide angle IR source will be located on MPN and the receiver at the Beach Station. This transmissometer will provide the ratio of the 3–5 and 8–12 μm transmissions between MPN and the Beach Station.

J. A buoy system that includes a Sonic anemometer (turbulent flow and temperature), mean wind speed and direction at 5 m, air temperature and relative humidity at 2 m, and a 1-D wave accelerometer (Ken Davidson, Naval Postgraduate School, Monterey, CA).

K. An AGA 3–5 and 8–12 μm thermal imager for polarization studies (Alf Cooper, U.S. Naval Postgraduate School, Monterey, CA).

L. Two tunable VHF transceivers for civilian frequencies.

A total of 6–7 U.S. Navy personnel (3–4 from NCCOSC, and three from the U.S. Naval Postgraduate School) will be required for the operation. Two persons will be at MPN, one or two for aircraft operation, one for the buoy installation, and two for the thermal imager. The point of contact tor this Navy equipment, its operation and the related data analysis is:

Dr. D. R. Jensen
NCCOSC RDT&E Div Code 543
53170 Woodward Road
San Diego, CA 92152–7385
Tel.: (619) 553–1415
Fax.: (619) 553–1417
Email: djensen@nosc.mil

7.2 RSG.5

7.2.1 THE NETHERLANDS

TNO instrumentation on the MPN tower includes:

A. A DUDA dual waveband IR imager will be located at MPN and will make slant path (0–3000 ft) transmission and variable sky background measurements at distances of 10 and 20 km from MPN utilizing the Lynx helicopter. Also, it will make measurements at 2, 5, 10, 15, 20, and 25 km from the platform with the helicopter at about 100 feet. The Lynx helicopter can be used as a source itself or a 20 cm × 20 cm hot source can be suspended underneath.

B. On the MPN lower deck (3–5 m above MSL), a 1000-Hz modulated source (900°K) for transmission measurements to the beach, will be mounted for a long-range transmission path. Detection at a beach station will be with a 20-cm collimator.

C. An operational FLIR

TNO instrumentation on the *Hr. Ms. Tydeman* includes:

A. Radiometers to measure the ship's hull temperatures (no calibrated sources).

B. The hull of the *Hr. Ms. Tydeman* offers a 5 m by 3.5 m target.

C. Possibly a smaller, but intensive, source with a large opening angle will be mounted on the *Hr. Ms. Tydeman.*

One person will be required for the TNO RSG.5 MPN effort. Point of contact is:

Dr. A. de Jong or
Dr. P. Schwering
Physics and Electronics Laboratory TNO
Oude Waalsdorperweg 63
2595 AK The Hague
The Netherlands
Tel.: [31] (70) 326 4221
Fax.: [31] (70) 328 0961
Email:—.feltno@fel.tno.nl

7.2.2 UNITED STATES (NAVY)

The IR imaging instrumentation planned by the United States Navy for MAPTIP includes:

A. Kodak (ONT/MIT) PtSi (3–5 micron) IR sensor (Joaquin Otazo, 617–981–3717).

a. Number of detector elements: 640 × 486

b. Detector size: 25 μm × 25 μm

c. Fill factor: 60%

d. Non-uniformity: 0.5%

e. Waveband: 1–6 μm

f. NE delta T: 0.15°C @ 300°K

g. Frame rate: 30 Hz

h. Optics diameter: 15 cm

i. Focal length: 30 cm

j. IFOV: 85 μradians

k. FOV: 3.1 deg (H) × 2.3 deg (V)

l. Filters: (3.2–4.1), (3–4.1), (4.52–5.32), (3.4–4.2), (4.5–5) μm

A total of 4–5 personnel are required to operate the IR imaging systems. It is preferred to operate the sensors on the MPN tower. The point of contact is:

Mr. James R. Buss
Office of Naval Research (ONR 2141)
800 North Quincy Street
Arlington, VA 22217–5660
United States
Tel.: (703) 696–4771
Fax.: (703) 696–4274
Email: (Not Available)

7.3 EQUIPMENT SUMMARY

7.3.1 The list of instruments to be fielded in the MAPTIP experiment are summarized in Appendix F. This summary includes also the planned personnel and tentative positioning of equipment.

8.0 ANALYSIS/REPORTS

8.1 Each participant will prepare a 1-page overview of his participation in MAPTIP and submit it, along with his logs, to the scientific committee, through TNO, by December 1993.

8.2 The scientific committee, through TNO, will then issue a summary of the available data containing a copy of the participants' logs, a synopsis of the operational accomplishments, and the weather conditions for the purpose of the analysis. It will be distributed by the end of February 1994.

8.3 Each participating group will provide the other groups with its validated data in proper units (mks) and on standard devices (floppy disks). The data packages will be accompanied by whatever instructions are necessary for their use and analysis. Preferably, these data files should be supplied on computer diskettes in PC compatible ASCII format. This task should be completed within six months after the trial. The aerosol data is to be in standard dN/dr format. Requests for individual aerosol data will be for a period averaged over a requested time frame. It is recommended that the Exabyte 8200 or 8500 be used to collect the image data (8 mm tapes). The format could be either TAR (UNIX) or NOVABACK for PC users. Appendix G list the information on Novaback (the software is about $100.00). All the IR data can be sent to Questech for redistribution to the RSG members at request in NATO,TAR or Novaback format. Lidar data will be distributed upon request for a certain time period and averaged over 10 minutes. Transmissometer data will consist of the mean transmittance over the complete spectrum, as well as the higher frequency components over a requested time period.

8.4 At the May 94 RSG.8 NATO meeting in Norway the following reports are planned:

A. A consensus of the meteorological data will be presented by Stuart Gathman, NCCOSC, i.e., air temperature, relative humidity, winds, pressure, sea surface temperature, and wave directions, data that are to be used by all participants for data analysis. All data to be in ASCII format for consensus analysis by Mar 1994.

B. The consensus of the spectrometer data (for an averaged period), i.e., the PMS probe data, rotorods, and aircraft (dN/dr) data, to be given by Dr. M. H. Smith, UMIST.

C. Each participant to give a 10-minute overview of the data they took and its application to the objective of MAPTIP. By this time each participant should have completed a fairly thorough examination of his data, to the extent that he is confident of its validity (or otherwise), so that various arrangements for future analysis of combined data sets could be made at this RSG.8 meeting.

D. The RSG.5 community to give a summary of the initial results by each participant.

8.5 During the May meeting (May 1994), it will be determined what data is to be archived and who will be responsible for the archiving of such.

8.6 A MAPTIP workshop will be held in May 1995, in conjunction with the RSG.8 meeting. Each participant is to plan a presentation on the data analysis that he has undertaken. Individual work will be presented and a common report for NATO discussed and formulated from the individual presentations.

9.0 GENERAL INFORMATION

9.1 All instrumentation, to be used on the MPN tower, will be shipped from The Hague, via boat, or helicopter. Since shipment by boat is the most economical, all instrumentation must be at TNO by 15 September to maximize the possibility of boat shipment. In the event that shipment by boat is not possible, as a result of high seas, shipment will be made by helicopter. When the NATO-budgeted funds for shipping have been expended, the overrun will be proportionally divided as per the amount of equipment shipped and payment made directly to TNO (check with your accounting department for proper procedure if such should occur). If your equipment is not at TNO on (or before) 15 September, each activity will be responsible for paying its own helicopter expenses. When preparing shipment to TNO, compile an identification list for customs that includes: 1) name and serial numbers of each piece, 2) value, 3) owner, 4) size, weight, and specification. The list should indicate that the equipment is to be used only in the research project MAPTIP and for how long the equipment will be in the country. Mail paperwork in advance (at least 3 weeks) to allow time for preparation for temporary importation into The Netherlands. Each participant is responsible for insuring his equipment, and TNO will accept no responsibility when items are damaged during transport, including transport by TNO to and from the harbor or platforms.

9.2 Equipment located at the Beach Station cannot be left unattended. The station is located on a public beach and must be guarded at all times. Security during operational hours will be the responsibility of the Beach Station participants. A professional security agent will be contracted to guard the station during the non-operational hours. A guard schedule will be made up by the platform manager and distributed during the pre-MAPTIP meeting on 10 October 1993. The cost for such services will be included in the total budget and shared by all.

9.3 Each participant is to determine his power requirements and submit them to TNO. However, each will be responsible for his (or her own) power and line conditioning (voltage regulators). Conditioning is very important as MPN operates on generator power and fluctuations are normal ($\pm$ 10%). Power available is 220 VAC, 50 Hz. If 110 VAC, 60 Hz is required, notify TNO.

9.4 It is recommended that shielded cable be used for all data runs to eliminate interference from generators and radio communication equipment (especially on the tower).

9.5 Participants on the MPN tower are encouraged to take only a small suitcase with them as the space on the helicopter is limited. Since warm clothing is a must, it is recommended that it be sent ahead with your equipment.

9.6 Visas are not required for The Netherlands.

9.7 Prior to the commencement of MAPTIP, a general participants' meeting will be held on 10 October 1993 at 1600 Hrs (location to be announced) to discuss last minute details on equipment installation and operational procedures. A list of participants, hotels, phone numbers etc. will be compiled and distributed at this meeting.

9.8 Should official visits be required to TNO and NAS Valkenburg, security clearances should be sent prior to the visit. Official clearances are not required by TNO, but visitors must show their passports at the reception office prior to the visit. No clearances are required for MPN but passports are required.

9.9 Each participant should address any problems that they might foresee in participating in MAPTIP with the scientific committee. Please do this prior to the May MAPTIP planning meeting so that questions may be addressed and answered at the meeting.

9.10 A limited amount of small and heavy items (such as batteries) might be shipped to MPN in advance. This equipment must be at TNO no later than 6 August 1993.

9.11 Requirements for liquid nitrogen should be made known to TNO for proper procurement and shipment to MPN.

10.0 COSTING

10.1 NATO and ONR funding is available to cover the logistic costs associated with MPN (i.e., boat and helicopter transportation, cook, steward, managers, etc.), Beach Station, Lynx helicopter, and the *Hr. Ms. Tydeman*. Per diem costs will be the responsibility of each participating activity. Appendix H outlines the cost estimates for MPN and the *Hr. Ms. Tydeman*. Per diem cost for MPN and the *Hr. Ms. Tydeman* will be paid to TNO directly by each participant. A grant of 1.000.000 BFR for logistics support has been requested from Panel 4. A grant of $30K U.S. dollars to TNO for personnel costs and logistics support has been obtained from the U.S. Office of Naval Research. If insufficient NATO and ONR funding occurs for the logistic costs, the overrun will be divided equally between participating activities and be paid to TNO (check with your purchasing department for expenditure of funds in such a way). The TNO financial department has formulated a suggested declaration for payment of cost overruns by each participant and it is included in Appendix H. The scientific committee will try to quantify these potential costs so that each participant will know the limits of their individual liabilities.

11.0 PARTICIPANT ADDRESSES AND E-MAIL INFORMATION

A completed list of all participants is included in Appendix I.

12.0 ACCOMMODATIONS

12.1 All shore based participants are responsible for their own accommodations. However, to facilitate the expediting of the pre- and post-platform meetings, tentative reservations have been made at the Pension van Beelen Hotel, Katwijk, for all shore based participants. The hotel is normally closed during the off season, but will remain open to accommodate the participants of MAPTIP. The Pension van Beelen is located within a few blocks of the Katwijk Beach Station and is well suited for our needs. TNO is coordinating all the arrangements with the Pension van Beelen Hotel so please make all reservations through them. Tourist information will be available at the hotel.

13.0 REFERENCES

1. Kneizys, F. X., E. P. Shettle, W. O. Gallery, J. H. Chetwynd, Jr., J. H. Abreu, J. E. A. Selby, S. A. Clough and R. W. Fenn, "Atmospheric Transmittance/Radiance: Computer Code LOWTRAN 6," Air Force Geophysical Laboratory Technical Report No. 83–0187, August 1983.
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6. Battalino, T. E. and R. A. Helvey "Air Mass Parameterization in the Navy Aerosol Model," Geophysical Sciences Technical Note no. 103, PMTC, Point Mugu, CA, 1985.
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8. Hughes, H. G. and M. R. Paulson, "Lidar Technique for Adjusting Aerosol Model Number Densities to Existing Conditions," NOSC TD 1637, September 1989.
9. Smith, M. H. and D. R. Bates, "Radon Concentrations over the North East Atlantic," UMIST Interim Report, April 91—May 92.
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13. de Leeuw, G., K. L. Davidson, S. G. Gathman and R. V. Noonkester, "Physical Models for Aerosol in the Marine Mixed-Layer," Paper 40 at AGARD Conference no. 453 on Operational Decision Aids for Exploiting or Mitigating Electromagnetic Propagation Effects, NATO, 1989.

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17. Cecere, T. H., "An Evaluation of the Naval Oceanic Vertical Aerosol Model during Key-90," NPS Thesis, June 1991.

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20. Paulson, M. R. and H. G. Hughes, "A Lidar Technique for Adjusting Aerosol Model Number Densities Close to the Ocean Surface," Naval Ocean Systems Center Technical Report 1388, Dec 1990.

APPENDIX A

MEETPOST NOORDWIJK TOWER (MPN),

HR. MS. TYDEMAN, AND

BEACH STATION INFORMATION

MAPTIP Platform/Site Information - MEETPOST NOORDWIJK

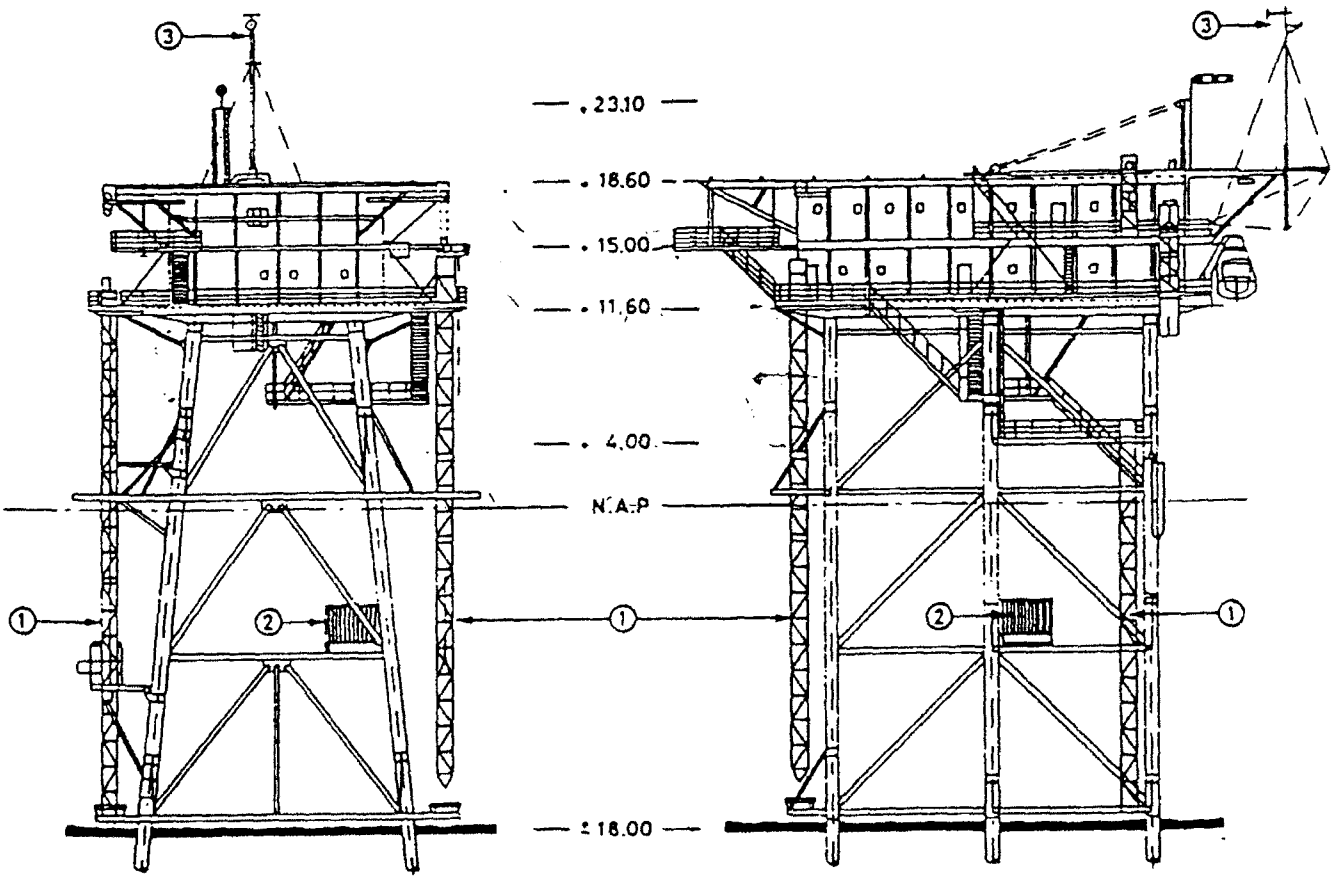
The owners of the platform sent a copy of their "conditions on the use of the platform" (in Dutch). Following are passages from these conditions that are of interest to the participants.

2.5. All instructions by the platform manager have to be obeyed.
3.1. The owners of the platform have to comply with all (scientific) equipment on the platform, its mounting and its electrical lay-out. *Thus, we will need at forehand a list of all instruments, its mounting, etc.*
3.2. Instruments to be connected to the local power-supply should be fitted for 220 V, 50 Hz (deviation 10%). The cosine of the angle of loss should be equal or larger than 0.8.
3.3. All instruments must be insensitive to momentary loss of local power.
3.4. All instruments should be fused to protect the main fuses of the platform and to turn the instrument off in the case of instrument malfunction.
3.5. No electrical hazards may arise from touching any part of an instrument. Electrical safety must exist up to ambient relative humidities of 95%, with the exception of laboratories I and II, where safety must exist up to 70%.
3.6. All instruments must be grounded.
3.7. The maximum weight that can be hoisted is 1500 kg.
4.1. The owners of the platform are not liable for any damage to personnel or equipment on the platform or during transport from/to the platform, unless the owners caused the damage intentionally.
4.2. The owners of the platform are not liable for any claims by a third party resulting from the use of the platform, unless the owners caused the damage intentionally.
4.3. All damage to properties of the platform owners (that is, the platform and its standard equipment) will be repaired and paid by the users of the platform.
7. All instruments have to be removed from the platform by the end of the experiment (*that is, Friday 5 November 1993*), unless otherwise agreed with the platform owners. In the latter case a written agreement is needed.
8.1. Transport to/from the platform of personnel and instruments will be arranged by the platform manager.
8.2. In the case of transportation by ship all passengers have to comply with instructions by the commander.
8.3. In the case of transportation by helicopter all passengers have to comply with instructions by the pilot or the Helicopter Landings Officer (HLO).
8.4. While transferring from the platform to the ship/helicopter all passengers have to comply with instructions by the platform manager.

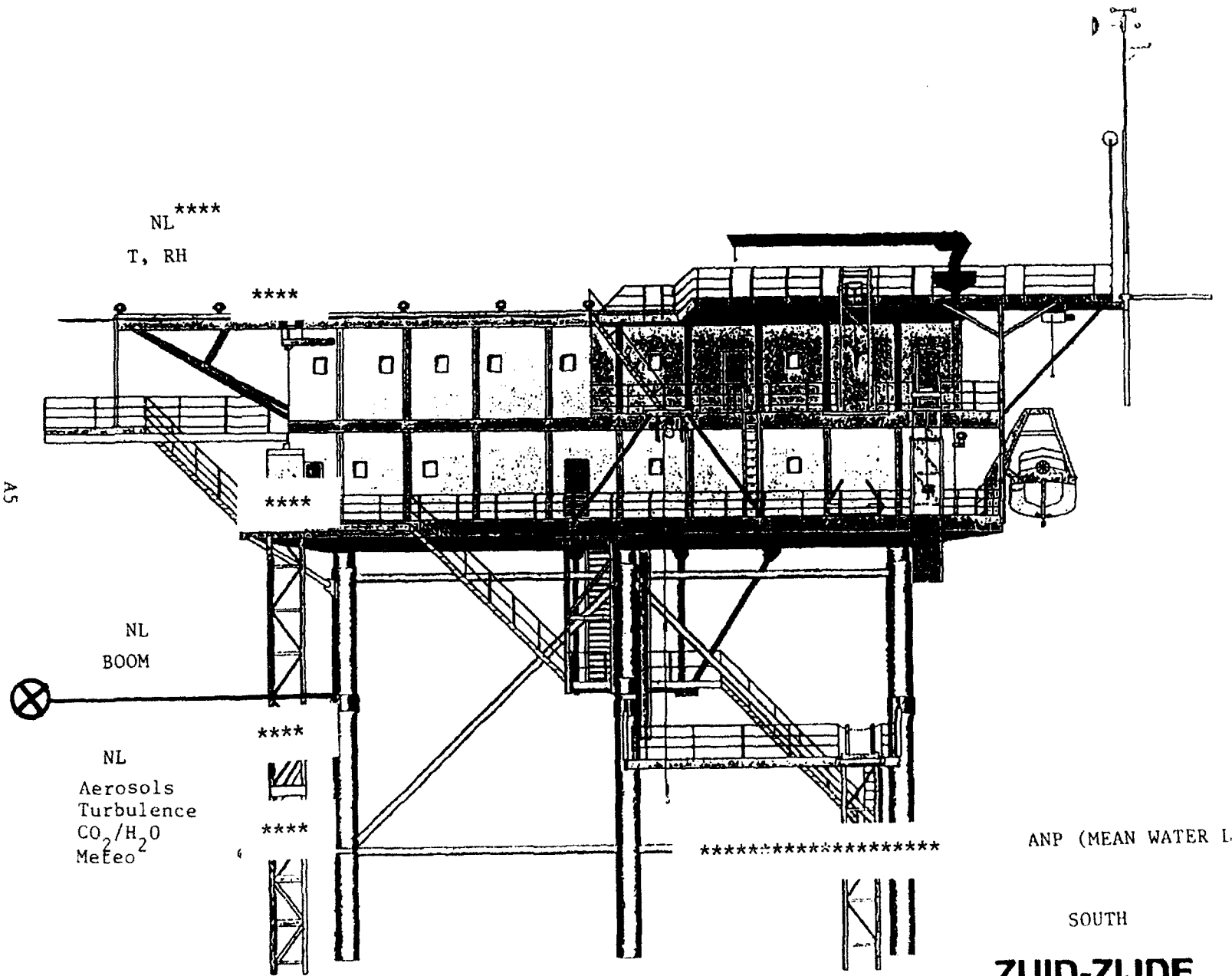
Characteristics:

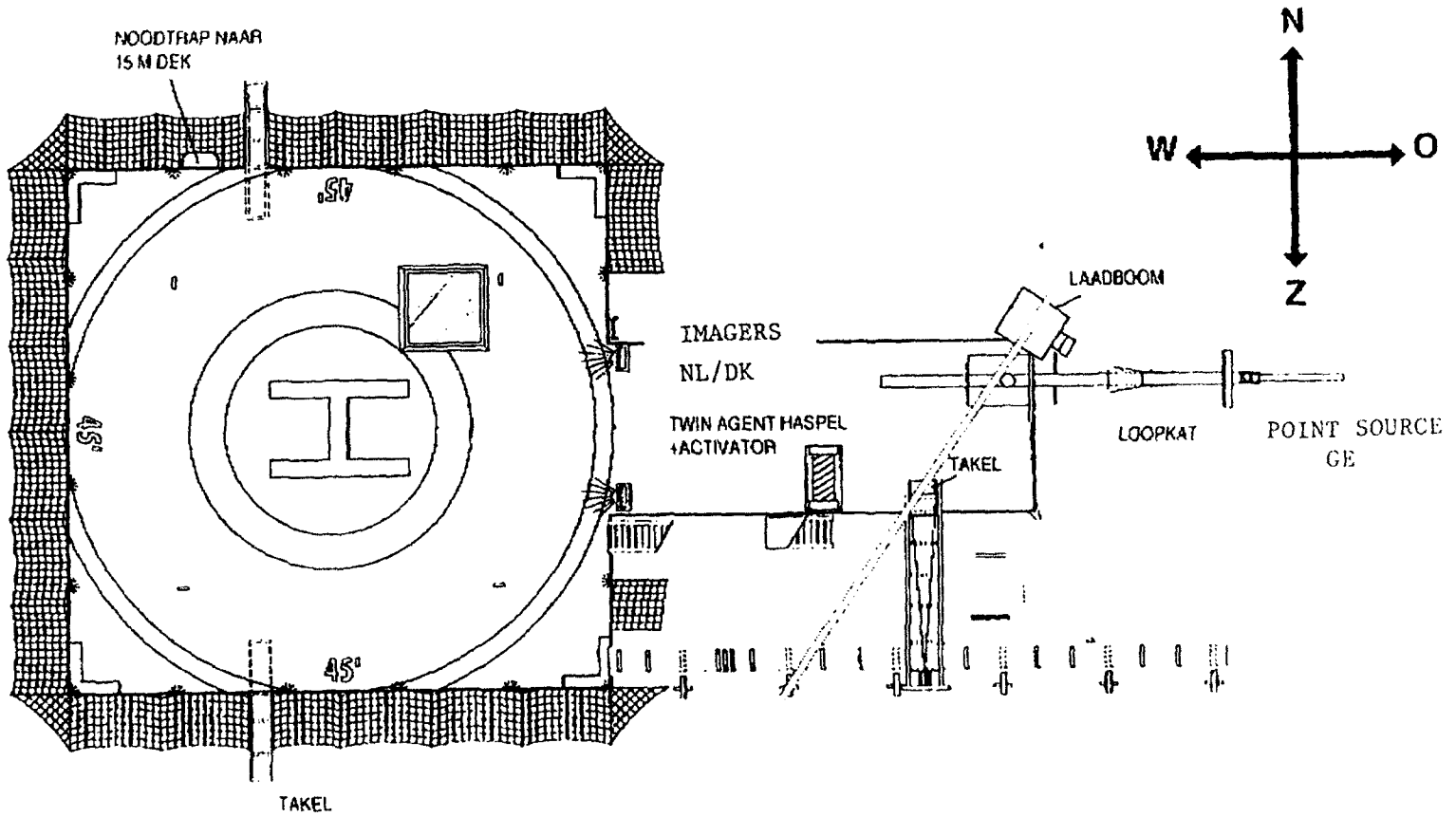
Position	: 52° 16' 25.9" N, 04° 17' 45.8" E
Construction	. Steel jacket construction, superstructure 25x16x7 m, two decks, helicopterdeck
Facilities	: Two measuring rooms, wet lab. and workshop, 3x50 KVA, 380/220 V, 50 Hz
Status mon.	: continuously remote monitoring of platform status during unmanned operation
Local data	: local presentation of actual hydro-meteo data from the North Sea Measuring Network
Communication	: Radio (UHF), telephone (direct dialling to (inter-) national telephone system
Accomodation	: 1x single cabin, 9x double cabin
Transport	: Helicopterdeck, ϕ15 m, max. load 4.4 tons, mooring facility for tender

Figure 5.1 shows the MPN platform as seen from the West (left) and from the South (right). In the drawing, the mean water level is at the line marked NAP ("Nieuw Amsterdams Peil") and heights are specified in meters with respect to NAP. On the next page, figure 5.2 shows the plan of the upper and lower decks of MPN.



West (left) and South (right) side views of MPN.

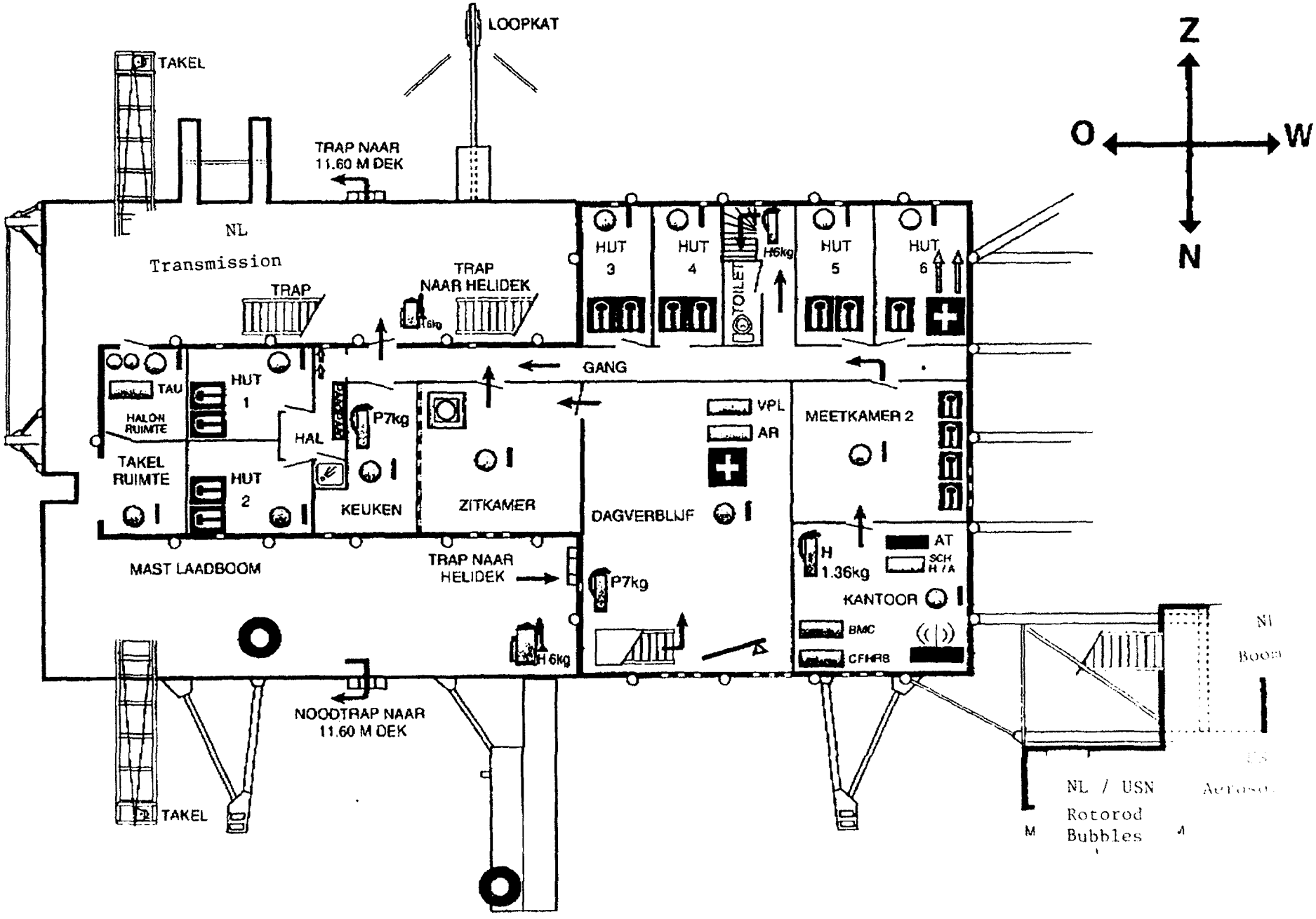

NL ****
T, RH
****
****
NL
BOOM
****
NL
Aerosols
Turbulence
CO_2/H_2O
Meteo
****
****
ANP (MEAN WATER LEVEL)
SOUTH
ZUID-ZIJDE
MPN



A6

HELIDEK GESCHIKT VOOR
MAXIMAAL S - 76 TYPE

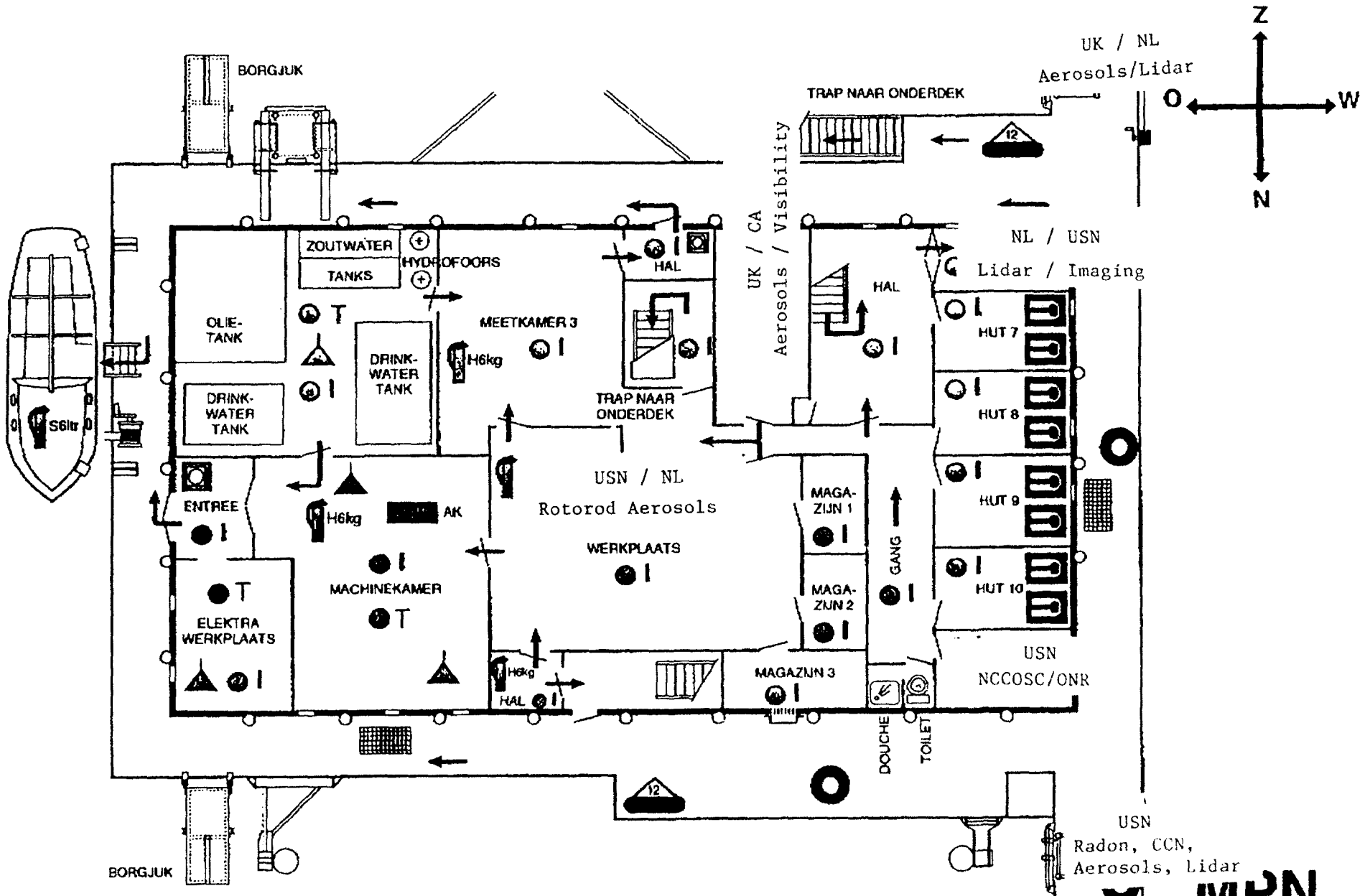
MPN


LOOPKAT
TAKEL
TRAP NAAR
11.60 M DEK
NL
Transmission
TRAP
TRAP
NAAR HELIDEK
HUT
3
HUT
4
TOILET
H5kg
HUT
5
HUT
6
Z
O
W
N
GANG
TAU
HALON
RUIMTE
HUT
1
HAL
P7kg
TAKEL
RUIMTE
HUT
2
KEUKEN
ZITKAMER
VPL
AR
DAGVERBLIJF
MEETKAMER 2
MAST LAADBOOM
TRAP NAAR
HELIDEK
P7kg
H
1.36kg
AT
SCH
H / A
KANTOOR
BMC
CFHRB
H6kg
NOODTRAP NAAR
11.60 M DEK
TAKEL
NL / USN
Rotorod
Bubbles
NL
Boom
US
Aerosol
M

A7

5 M DEK

MPN


BORGJUK
ZOUTWATER TANKS
HYDROFOORS
OLIE-TANK
DRINK-WATER TANK
DRINK-WATER TANK
MEETKAMER 3
H6kg
HAL
TRAP NAAR ONDERDEK
UK / CA
Aerosols / Visibility
UK / NL
Aerosols/Lidar
TRAP NAAR ONDERDEK
NL / USN
Lidar / Imaging
HAL
HUT 7
HUT 8
HUT 9
HUT 10
S6ltr
ENTREE
H6kg
AK
USN / NL
Rotorod Aerosols
WERKPLAATS
MAGA-ZIJN 1
MAGA-ZIJN 2
GANG
MACHINEKAMER
ELEKTRA WERKPLAATS
H6kg
HAL
MAGAZIJN 3
USN
NCCOSC/ONR
DOUCHE
TOILET
USN
Radon, CCN,
Aerosols, Lidar
BORGJUK
Z
O
W
N
MPN

A8

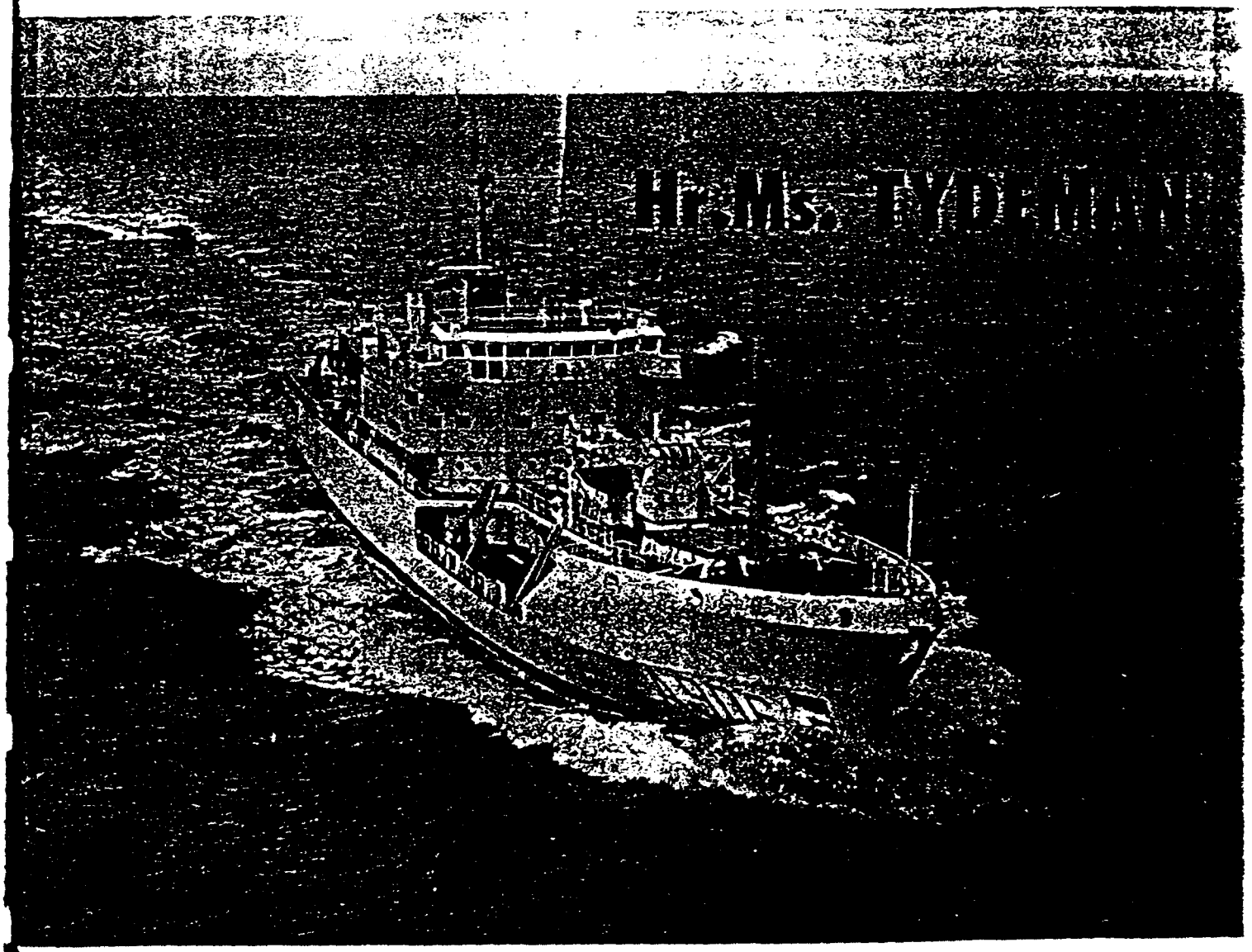
11.60 M DEK

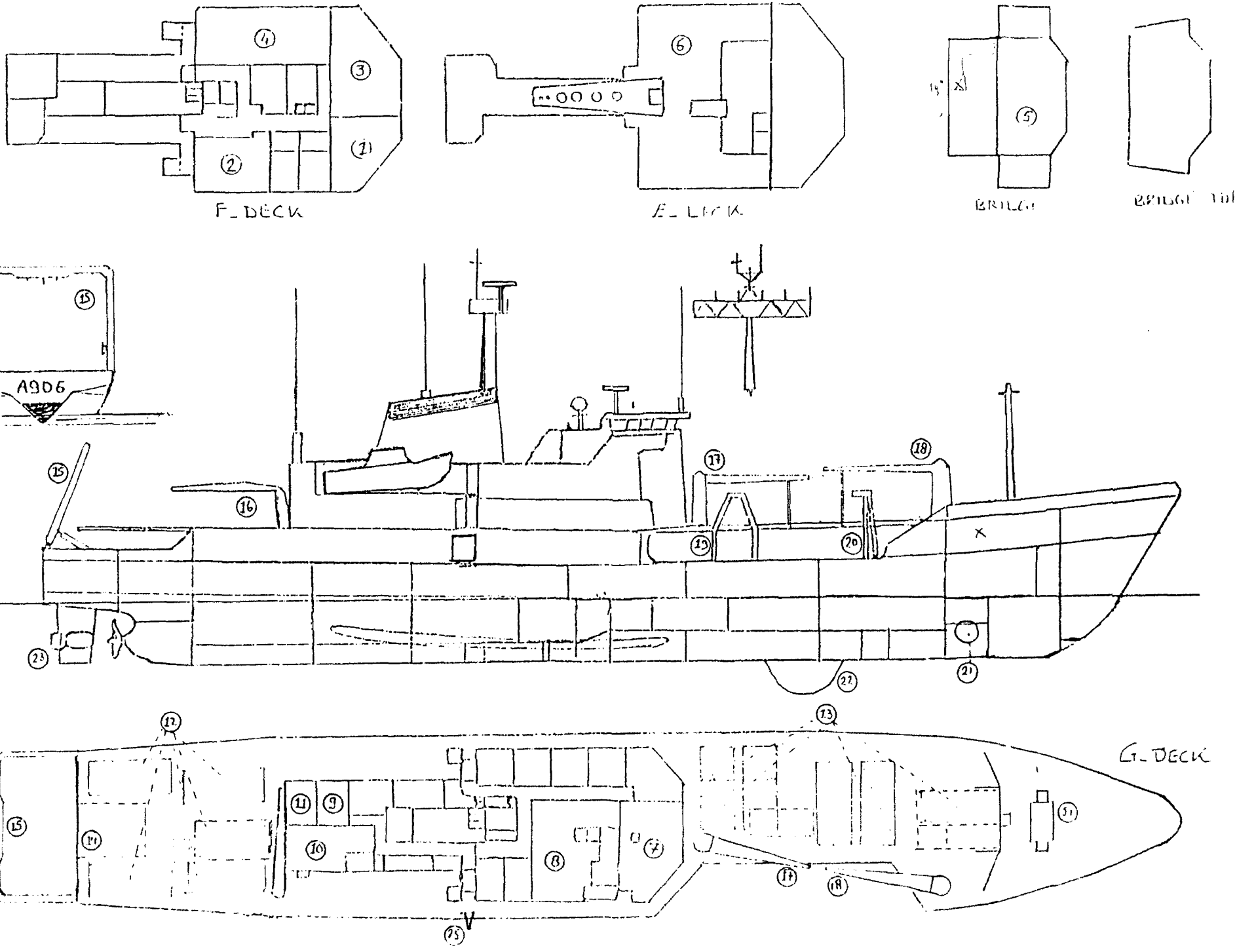
HR. MS. TYDEMAN

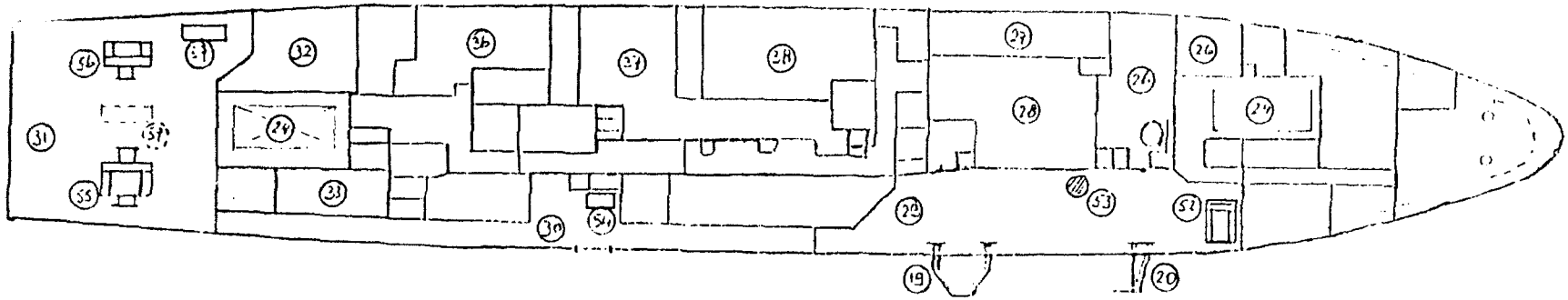
MAPTIP Platform/Site Information - Hr.Ms. TYDEMAN

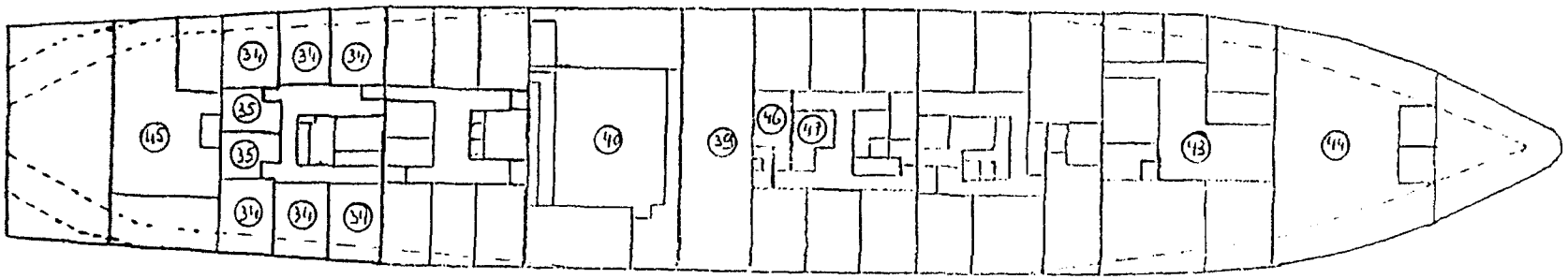
The Hr.Ms. Tydeman (see figure 5.3) has a length of 77 meters and a width of 14.5 m. The deplacement amounts to 2900 tons and its draught to 4.75 m. Its speed ranges from 0.8 - 15 knots. A helicopter landing deck is present. The ship is equipped with a VHF-SRC 01/00, 28 channel radio (20 Watts).

Power supplies:	440 V, 60 Hz, 3 ~	380 V, 50 Hz, 3 ~
	220 V, 50 Hz, 1 ~	220 V, 60 Hz, 1 ~
	199 V, 60 Hz, 3 ~	115 V, 60 Hz, 1 ~
	115 V, 60 Hz, 3 ~	115 V, 400 Hz, 1 ~
	24 V DC	

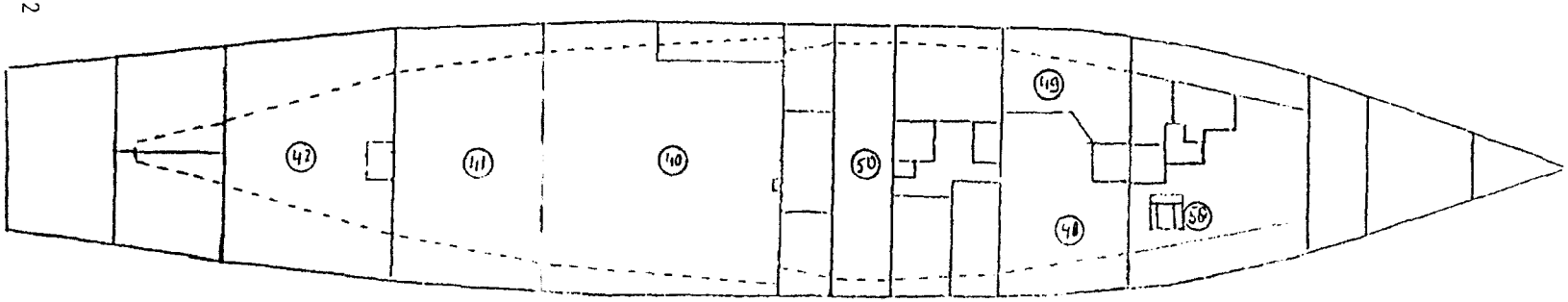


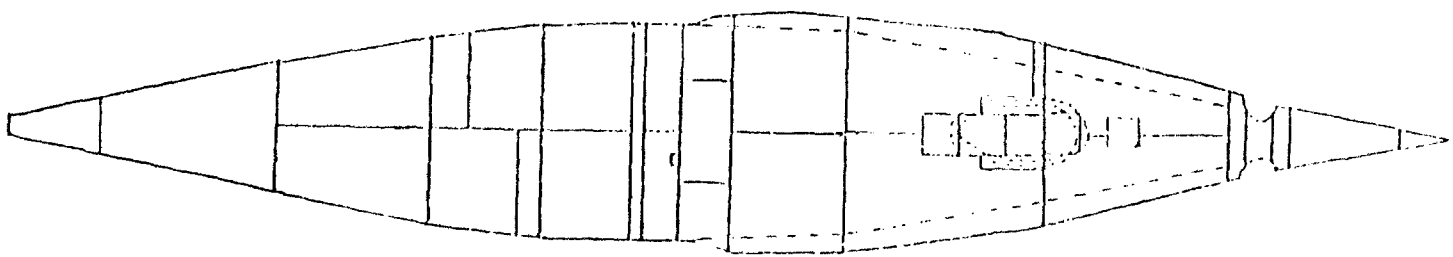

F_DECK
E_DECK
BRIDGE
A906
A11
G_DECK





A12





LEGENDA ON SHIPS' GENERAL PLAN

1. Captains' quarters
2. Chief scientists' quarters
3. Conference and drawing room
4. Central Computerroom and meteostation
5. Navigation bridge

6. Chart room
7. Ships'officers and guests 'messroom
8. Wardroom (officers and guests)
9. Double berth cabin
10. Communications

11. Weather balloon filling station
12. 5 Containerpositions aft
13. 5 Containerpositions fore
14. Removable deck part
15. Gallows

16. 40 kN Crane
17. 40 kN Crane
18. 20 kN Crane
19. A-frame
20. L-frame

21. Bow thruster
22. Removable sonardome
23. Active rudder
24. Containerpositions below deck
25. A-frame amidship

26. Laboratory I (a.o. freezer mountings)
27. Laboratory II/III
28. Wet hall.
29. Working deck fore
30. Corridor

31. Working deck aft (Quarter deck)
32. Laboratory V
33. 4 Berths cabin
34. Double berth cabins
35. Single berth cabins

36. CPO's mess
37. Galley
38. Junior ratings' mess
39. Engine control room
40. Engine room

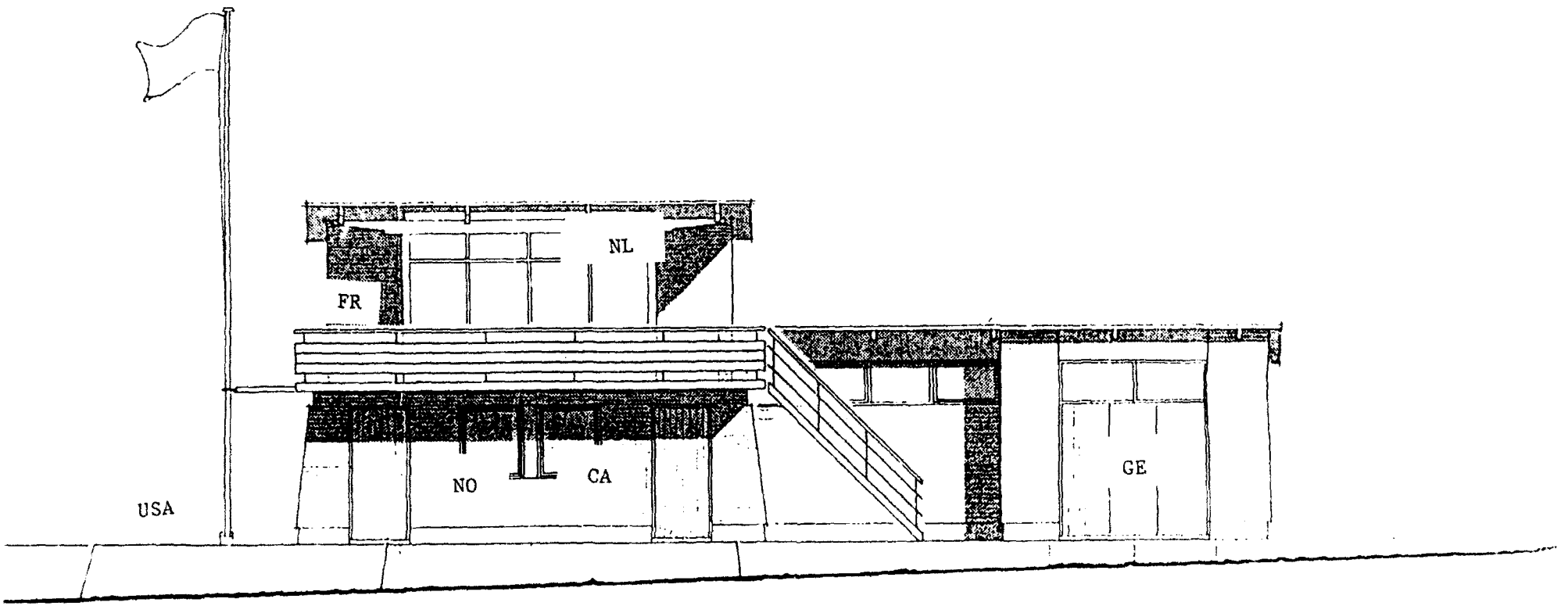
41. Auxiliary engine room
42. Main electric propulsion engine room
43. Landing with freezers/refrigerators
44. Hold number 1
45. Hold number 2

46. Laboratory VI (hydrophone winch)
47. Sea gravimeter room
48. Oceanographic winch room
49. Laundry
50. Anti-roll tank

51. Anchor winch
52. General purpose cable winch
53. Capstan
54. Hydrographic winch
55. Towing winch

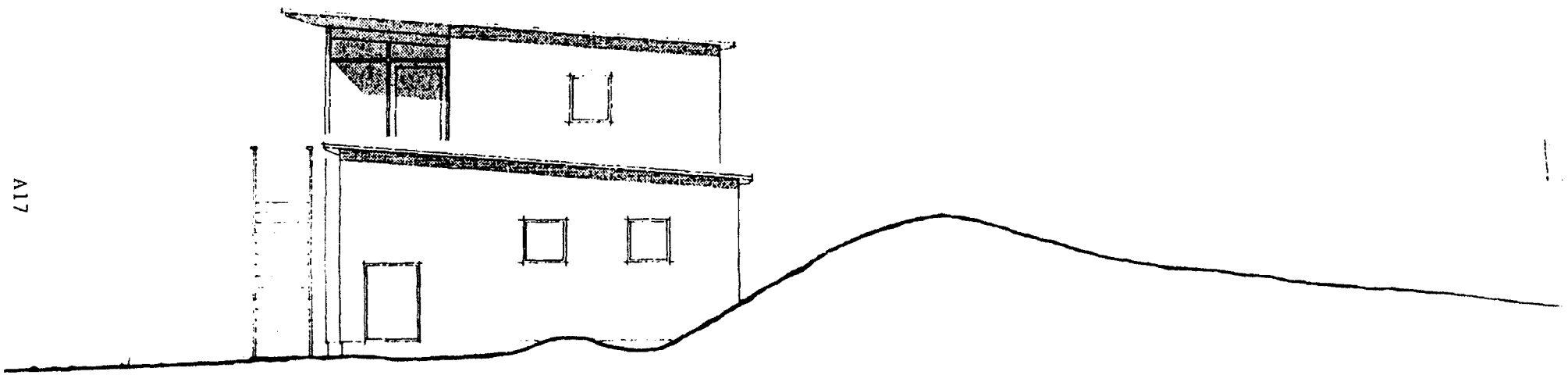
56. Towing winch with provisions for signal leads
57. Cable winch (removable)
58. Hydrographic winch

KATWIJK BEACH STATION



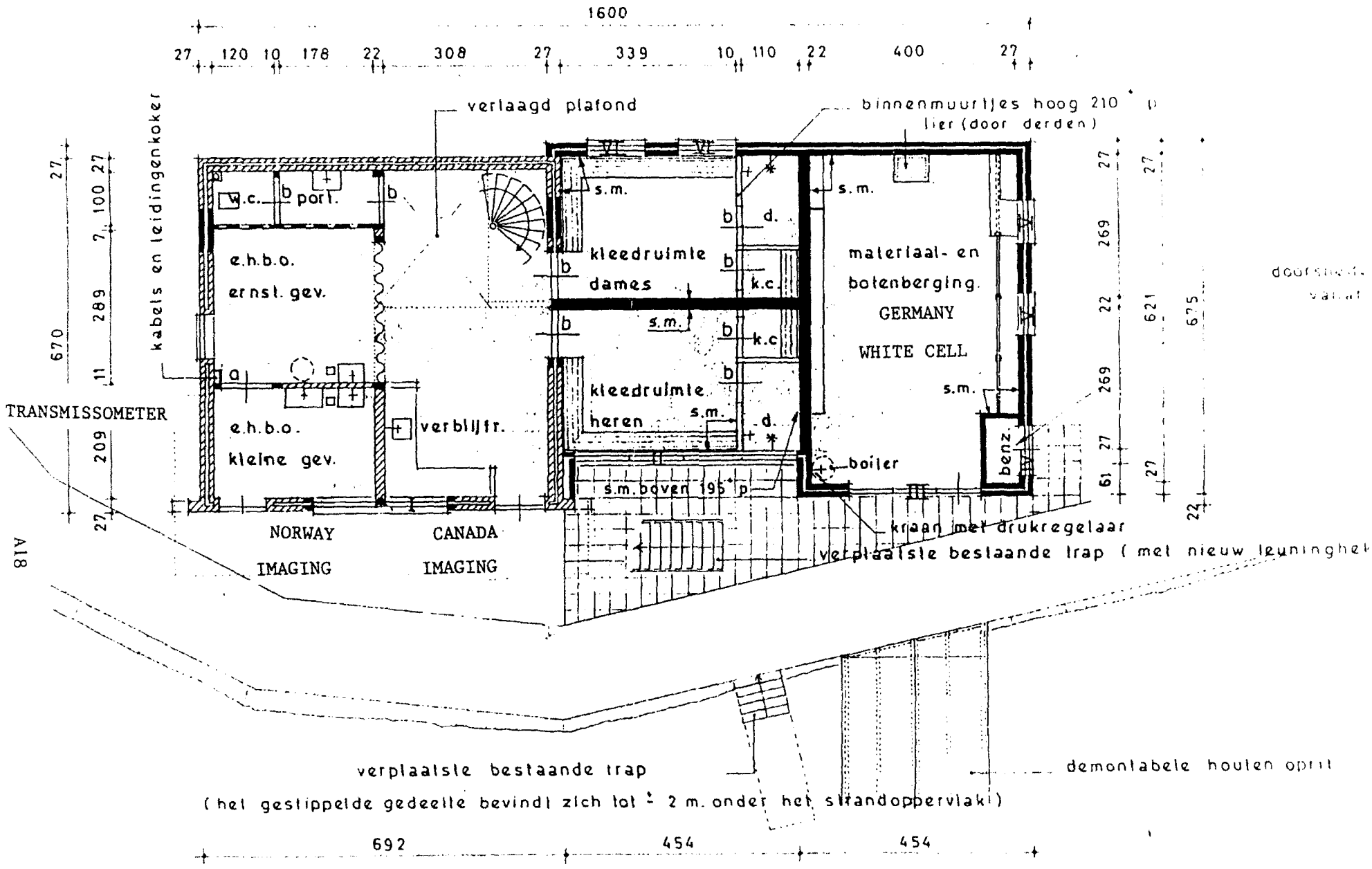
A16

VOORGEVEL

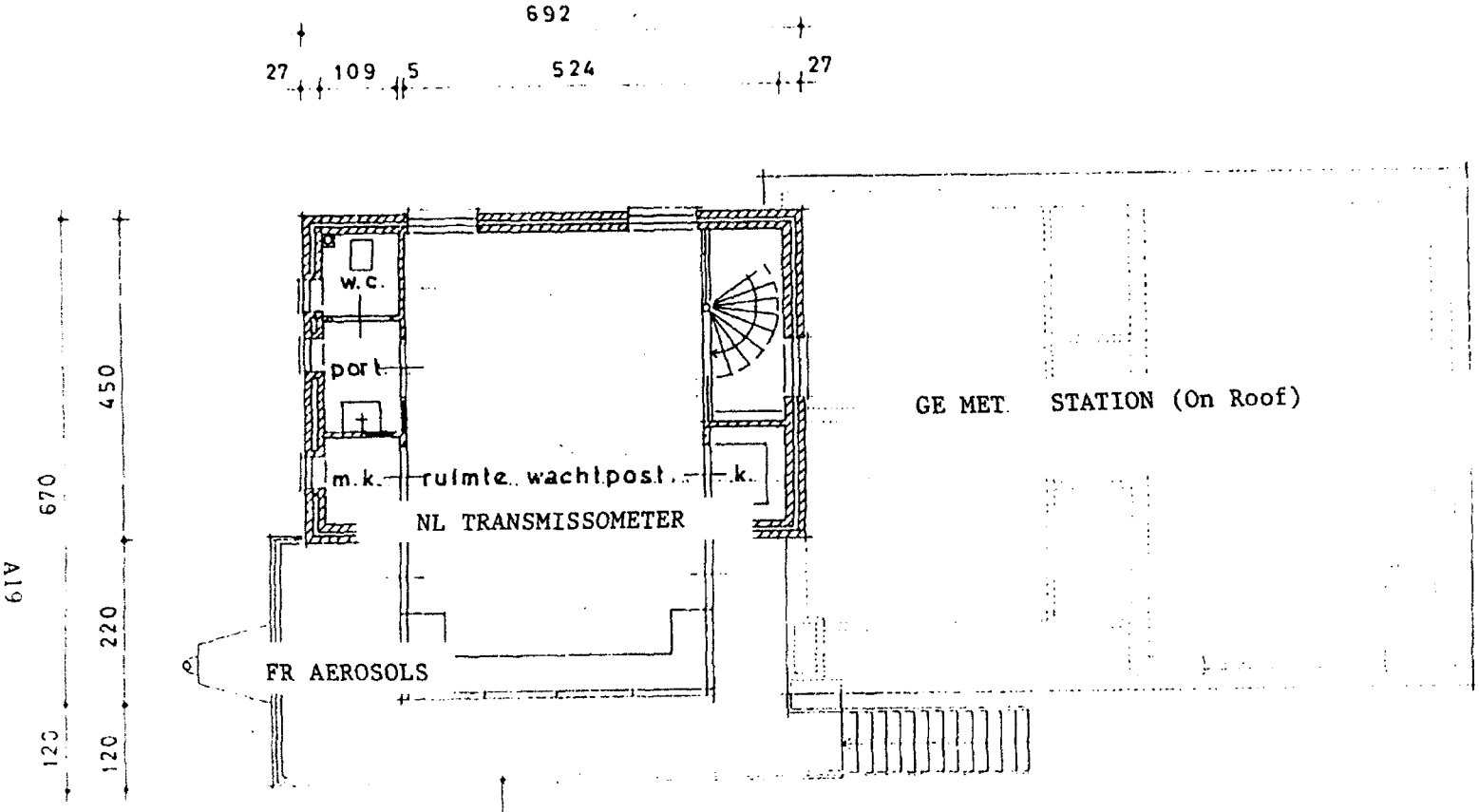


A17

RECHTER ZUGEVEL



PLATTEGROND BEGANE GROND



nieuw werzalit balkonhek bestaande uit aluminium balusters, een werzalit bovenregel en 3 horizontale werzalit delen (als omschreven in bestek)

50 130 432 130 50

PLATTEGROND VERDIEPING

APPENDIX B

MAPTIP TEST SCHEDULE OF EVENTS

MAPTIP TEST SCHEDULE OF EVENTS

The daily MAPTIP time schedule for October and November is shown in Table B1. The schedule is divided into operational blocks A, B, and C. Tables B2 through B8 outline these blocks according to operational time periods. Included are the operational procedures for the Tydeman, the NCCOSC airborne platform (Navajo), the P-3, the Lynx helicopter, and the Tydeman radiosonde release times. WPA, WPB, WPC, ..., etc., indicate way point positions established for the MAPTIP experiment. MPN refers to the Meetpost Nordwijk tower. Table B9 gives the latitude and longitude for each of these way points. WPA - WPB indicates an operational procedure starting at WPA and proceeding to WPB. Table B10 shows the distance/bearing grid for all the operational way points. Table B11-B17 show the time line sequence of Block A, B, and C (Tables B2-B8).

Figure B1 shows the geographical layout for the way points. Way points E and F were established on a 250° (T) radial from MPN and the Beach Station to take advantage of the sun-glint look angles for the IR imagers. Figures B2 through B4 show graphically the operational Blocks A, B, and C. The radial from MPN to WPC was chosen to coincide with the direction of the setting sun (approximately 250° (T) for latter part of October and the first part of November). The radial between MPN and WPA was selected to be at a bearing of 90° clockwise to the sun-glint radial. The difference between Block A and Block B is that Block A proceeds in a counter clockwise direction from WPB to WPA, etc., where Block B proceeds in a clockwise direction from WPB to WPC. This reversal allows for better observation of sun glint conditions during afternoon hours. Block C was established for weekend operations where the operational times have been reduced.

The "OVERNIGHT" category (Table B1) describes what the Tydeman is scheduled to do overnight. The short and long sails refer to when the Tydeman will make short or long cruises to collect aerosol data at different geographic locations. When marked "Free", individual participants may requests the use of the Tydeman for special operations.

The Lynx helicopter will image the Tydeman at the start of each flight and then fly the indicated radials as per the flight plan outline in Table B1 through B8 (reference time line Tables B11-B17), i.e., on Oct 19 from 0930-1130 MET the Lynx will fly on the radial from WPB - WPN - WPD. At 1530 - 1730 MET the radial is repeated. Tables B18 and B19 gives a complete flight plan for the Lynx helicopter. The Lynx itself can be used as a target as well as the suspended calibrated target (See equipment list for The Netherlands, RSG.5). On the described radials the Lynx will fly a triangular pattern as shown in Figure B5 through B7. At each indicated position the Lynx will hold for 2 minutes for IR imaging. It has been requested by the RSG.5, USN representative, that the Tydeman fly a special profile to substantiate the belief that in a

glinting enviroment (solar clutter solar elevations below 20 degrees) that a target will go in and out of reverse contrast at various angles off the solar azimuth. Thereore, it is important to take data of a radiometric target as the LYNX flys radials from MPN at -10, -5, 0, 5, and 10 degrees off solar azimuth (as viewed from MPN). This target should be on the order of 15 m above the ocean surface on the radials out. An attempt will be made to work this fligh profile into the schedule. Communication with the Lynx will be through the dedicated VHF civilian channel.

The P3 flight plan is given in Table B20.

TABLE B1. **MAPTIP TEST SCHEDULE SUMMARY[1,2]**

DATE	BLOCK A	BLOCK B	BLOCK C	OVERNIGHT
OCT 18 (MONDAY)			1300-1900[3]	ANCHOR MPN
OCT 19 (TUESDAY)	0900-1830			SHORT SAIL
OCT 20 (WEDNESDAY)		0800-1730		FREE
OCT 21 (THURSDAY)	0900-1830			LONG SAIL
OCT 22 (FRIDAY)		1430-2400		ANCHOR MPN
OCT 23 (SATURDAY)			1300-1900	LONG SAIL
OCT 24 (SUNDAY)			0700-1300[4]	LONG SAIL
OCT 25 (MONDAY)	0400-1330			LONG SAIL
OCT 26 (TUESDAY)	0900-1830			FREE
OCT 27 (WEDNESDAY)		0800-1730		FREE
OCT 28 (THURSDAY)	0900-1830			LONG SAIL
OCT 29 (FRIDAY)		1430-2400		LONG SAIL
OCT 30 (SATURDAY)			1300-1900[4]	LONG SAIL
OCT 31 (SUNDAY)			0700-1300	ANCHOR MPN
NOV 1 (MONDAY)		0400-1330		LONG SAIL
NOV 2 (TUESDAY)	0900-1830			FREE
NOV 3 (WEDNESDAY)		0800-1730		

[1] All times are in Local Time (MET).
[2] Sunrise times range from 07:12 MET (Oct 18) to 07:41 MET (Nov 3). Sunset from 17:39 MET (Oct 18) to 17:07 MET (Nov 3), Direction 250°N.
[3] On 18 Oct the Tydeman will not be on station until 1430 MET.
[4] On 24 and 30 Oct the Tydeman will be making long runs and will not be available during the scheduled operation. All other scheduled activities will proceed.

TABLE B2. **MAPTIP BLOCK A TEST SCHEDULE (0400 - 1330 MET)**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
0400 - 0530	WPB - WPA				
0530	WPA	X			
0530 - 0730	WPA - MPN				
0630 - 0830			STAR		
0730	MPN	X	SP (MPN)		
0730 - 0800	MPN - WPB				
0800	WPB	X			
0800 - 0930	WPB - MPN				
0930 - 1130	MPN - WPC				
0930 - 1130			STAR		
1030			SP (MPN)		
1130	WPC	X			
1130 - 1330	WPC - WPA				
1130 - 1330					WPB-MPN-WPD
1130 - 1330				WPC - WPA	

TABLE B3. **MAPTIP BLOCK A TEST SCHEDULE (0900 - 1830 MET)**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
0900 - 1030	WPB - WPA				
0930 - 1130					WPB-MPN-WPD
1030	WPA	X			
1030 - 1230	WPA - MPN				
1130 - 1330			STAR		
1230	MPN	X	SP (MPN)		
1230 - 1300	MPN - WPB				
1300	WPB	X			
1300 - 1430	WPB - MPN				
1430 - 1630	MPN - WPC				
1430 - 1630			STAR		
1530			SP (MPN)		
1530 - 1730					WPB-MPN-WPD
1630	WPC	X			
1630 - 1830	WPC - WPA				
1630 - 1830				WPC - WPA	

TABLE B4. **MAPTIP BLOCK B TEST SCHEDULE (0400 - 1330 MET)**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
0400 - 0530	WPB - WPC				
0530	WPC	X			
0530 - 0730	WPC - MPN				
0630 - 0830			STAR		
0730	MPN	X	SP (MPN)		
0730 - 0800	MPN - WPB				
0800	WPB	X			
0800 - 0930	WPB - MPN				
0930 - 1130	MPN - WPA				
0930 - 1130			STAR		
1030			SP (MPN)		
1130	WPA	X			
1130 - 1330	WPA - WPC				
1130 - 1330					WPB-MPN-WPD
1130 - 1330				WPA - WPC	

TABLE B5. **MAPTIP BLOCK B TEST SCHEDULE (0800 - 1730 MET)**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
0800 - 0930	WPB - WPC				
0830 - 1030					WPB-MPN-WPD
0930	WPC	X			
0930 - 1130	WPC - MPN				
1030 - 1230			STAR		
1130	MPN	X	SP (MPN)		
1130 - 1200	MPN - WPB				
1200	WPB	X			
1200 - 1330	WPB - MPN				
1330 - 1530	MPN - WPA				
1330 - 1530			STAR		
1430			SP (MPN)		
1530	WPA	X			
1530 - 1730	WPA - WPC				
1530 - 1730					WPB - WPE
1530 - 1730				WPA - WPC	

TABLE B6. **MAPTIP BLOCK B TEST SCHEDULE (1430 - 2400 MET)**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
1430 - 1600	WPB - WPC				
1500 - 1700					MPN - WPF
1600	WPC	X			
1600 - 1800	WPC - MPN				
1700 - 1900			STAR		
1800	MPN	X	SP (MPN)		
1800 - 1830	MPN - WPB				
1830	WPB	X			
1830 - 2000	WPB - MPN				
2000 - 2200	MPN - WPA				
2000 - 2200			STAR		
2100			SP (MPN)		
2200	WPA	X			
2200 - 2400	WPA - WPC				
2200 - 2400					WPB-MPN-WPD
2200 - 2400				WPA - WPC	

TABLE B7. **MAPTIP BLOCK C TEST SCHEDULE (0700 - 1300)[1,2,3,4]**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
0700 - 0900	WPA - MPN				
0700	WPA	X			
0800 - 1000			STAR		
0900	MPN	X	SP (MPN)		
0900 - 0930	MPN - WPB				
0930	WPB	X			
0930 - 1100	WPB - MPN				
1100 - 1300	MPN - WPC				
1100 - 1300			STAR		
1200			SP (MPN)		
1300	WPC	X			

[1] WEEKENDS - AEROSOLS & IR BACKGROUND STUDIES. NO SUPPORT FROM THE LYNX OR P-3.

[2] OPERATION TIMES DURING WEEKENDS MAY BE ADJUSTED TO TAKE ADVANTAGE OF DIFFERENT METEOROLOGICAL CONDITIONS.

[3] TIME TO LOOK AT DATA AND REPAIR EQUIPMENT.

[4] ON 24 OCT (SUNDAY) THE TYDEMAN WILL BE ON A LONG SAIL AND WILL NOT BE AVAILABLE FOR RADIALS.

TABLE B8. **MAPTIP BLOCK C TEST SCHEDULE (1300 - 1900 MET)[1,2,3,4]**

TIME (MET)	TYDEMAN	RAOB	NAVAJO	P-3	LYNX
1300 - 1500	WPA - MPN[5]				
1300	WPA[5]	X			
1400 - 1600			STAR		
1500	MPN[5]	X	SP (MPN)		
1500 - 1530	MPN - WPB				
1530	WPB	X			
1530 - 1700	WPB - MPN				
1700 - 1900	MPN - WPC				
1700 - 1900			STAR		
1800			SP (MPN)		
1900	WPC	X			

[1] WEEKENDS - AEROSOLS & IR BACKGROUND STUDIES. NO SUPPORT FROM THE LYNX OR P-3.

[2] OPERATION TIMES DURING WEEKENDS MAY BE ADJUSTED TO TAKE ADVANTAGE OF DIFFERENT METEOROLOGICAL CONDITIONS.

[3] TIME TO LOOK AT DATA AND REPAIR EQUIPMENT.

[4] ON 30 OCT (SATURDAY) THE TYDEMAN WILL BE ON A LONG SAIL AND WILL NOT BE AVAILABLE FOR RADIALS.

[5] ON 18 OCT THE TYDEMAN WILL NOT BE ON STATION UNTIL 1430 MET. THE TYDEMAN WILL COMMENCE THE RADIAL FROM MPN TO WPB AT 1500 MET AS SCHEDULED.

TABLE B9. **MAPTIP WAY POINT COORDINATES**

Location	Latitude (North)	Longitude (East)
MPN	52° 16' 26"	04° 17' 46"
WPA	52° 25' 50"	04° 12' 09"
WPB	52° 11' 52"	04° 22' 58"
WPC	52° 13' 00"	04° 02' 26"
WPD	52° 27' 53"	04° 04' 35"
WPE	52° 07' 03"	04° 01' 33"
WPF	52° 11' 37"	03° 56' 18"

TABLE B10. **MAPTIP WAY POINT DISTANCE/BEARING GRID***

FR\TO	MPN	WPA	WPB	WPC	WPD	WPE	WPF
MPN	---	10/340	5.6/145	10/250	14/325		14 /250
WPA	10/160	---	15.5/155	14/205			
WPB	5.6/325	15.5/335	---	12.6/275	19.6/325	14/250	
WPC	10/070	14/025	12.6/95	---			
WPD	14/145		19.6/145		---		
WPE			14/070			---	
WPF	14/070						---

* Distance/Bearing (NMi/Degrees[true])

MAPTIP BLOCK A TEST SCHEDULE (0400 - 1330 MET)

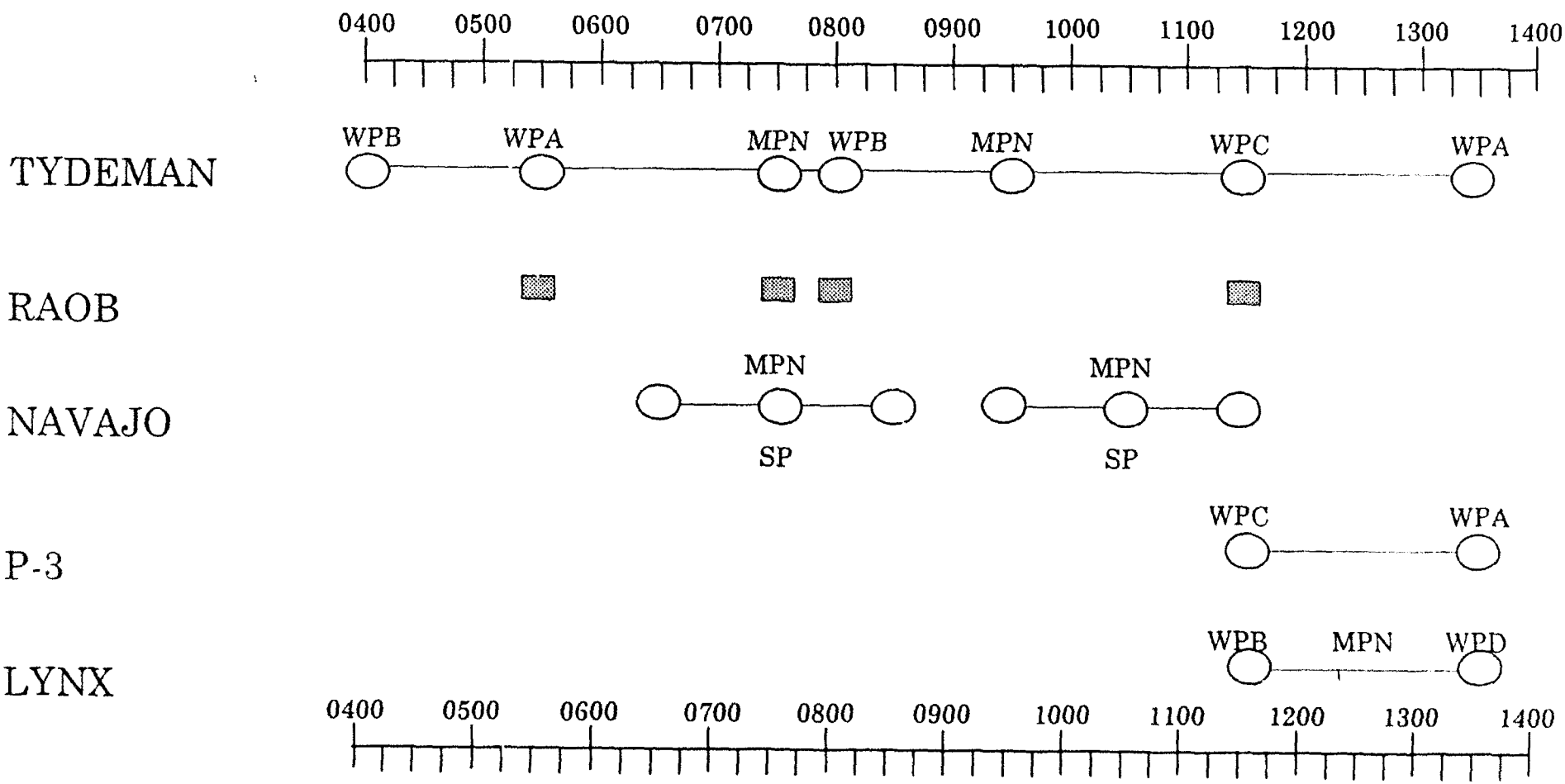


TABLE B12.

MAPTIP BLOCK A TEST SCHEDULE (0900 -1830 MET)

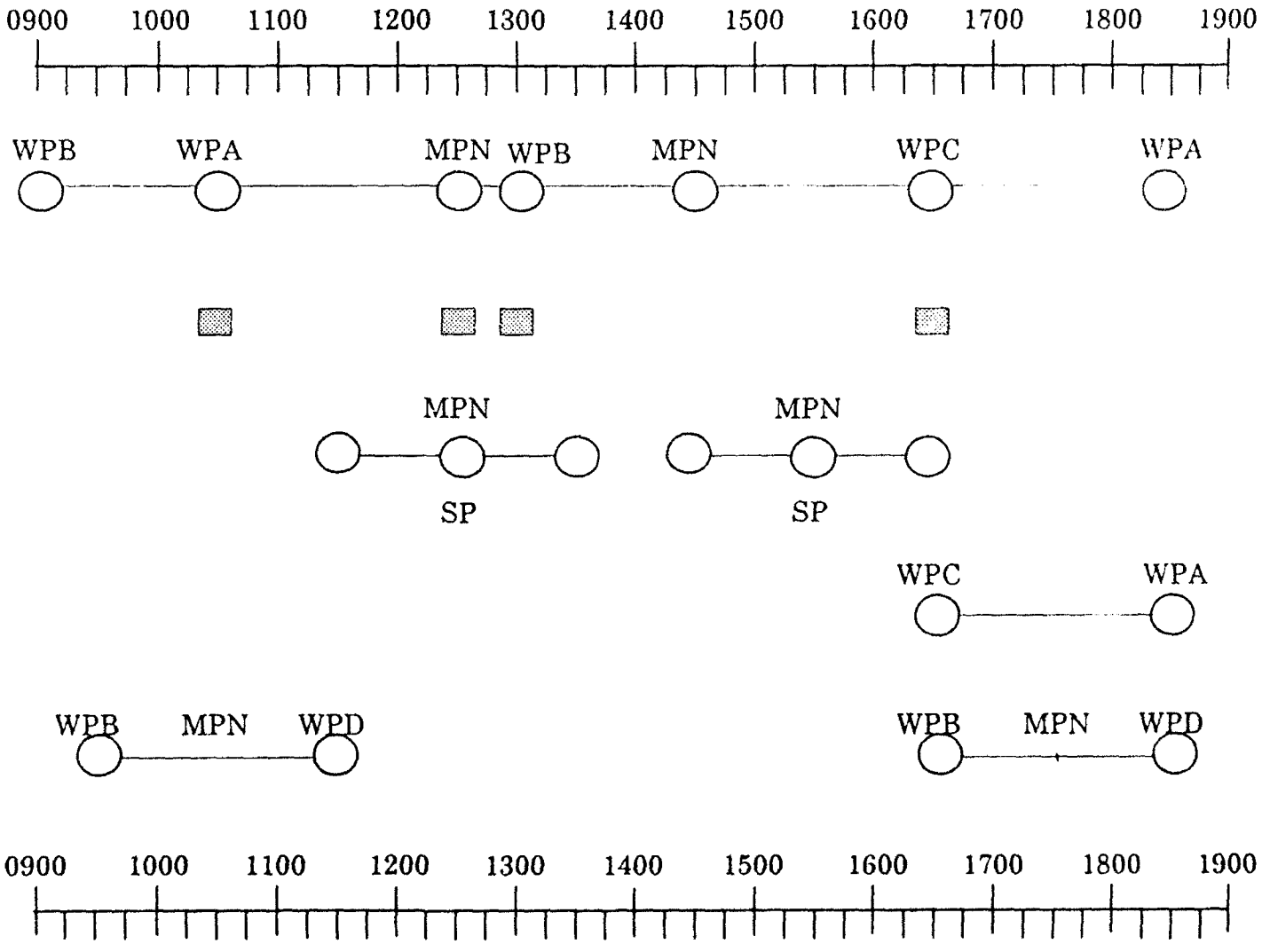


TABLE B13.

MAPTIP BLOCK B TEST SCHEDULE (0400 - 1330 MET)

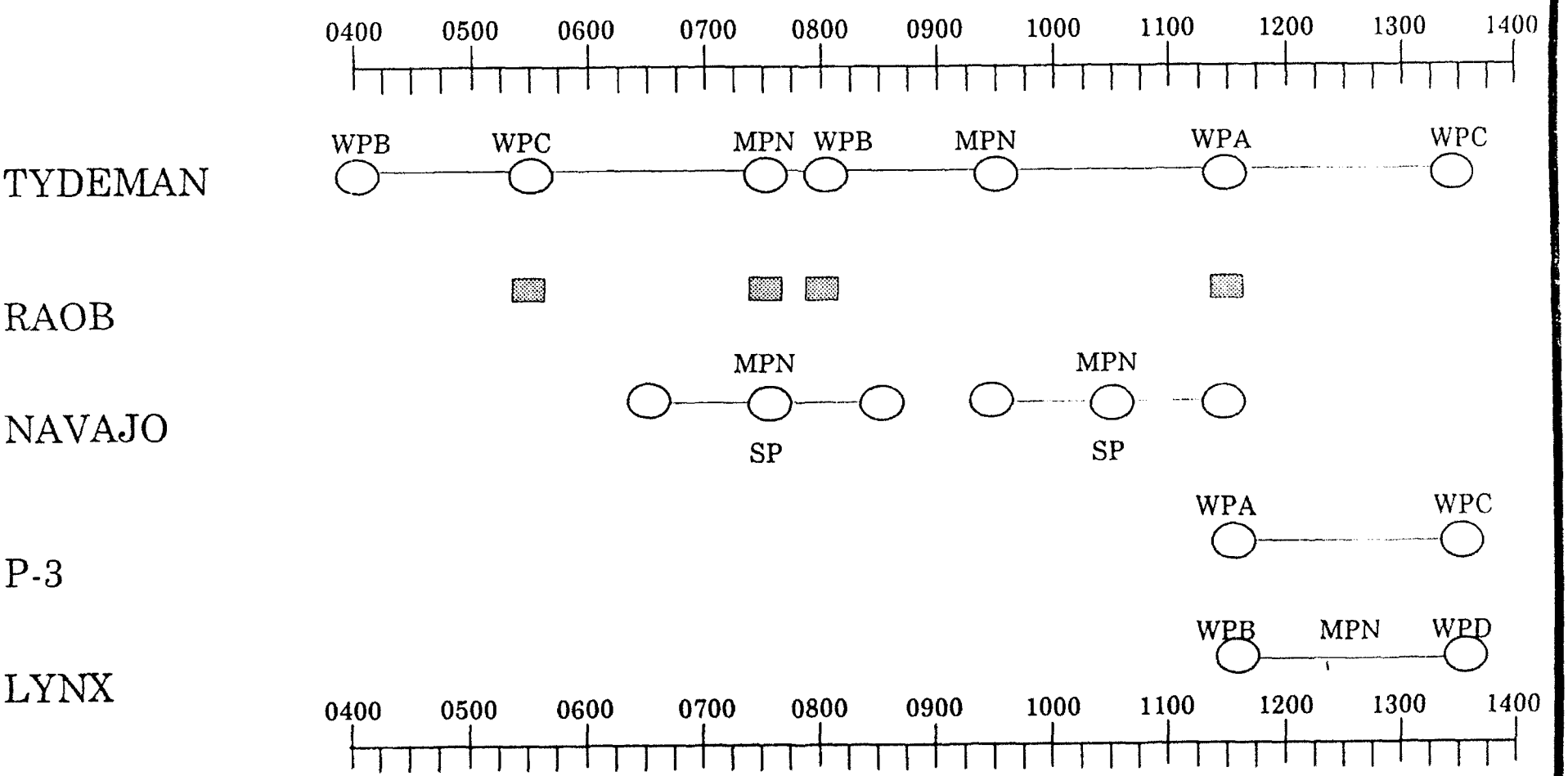


TABLE B14.

MAPTIP BLOCK B TEST SCHEDULE (0800 - 1730 MET)

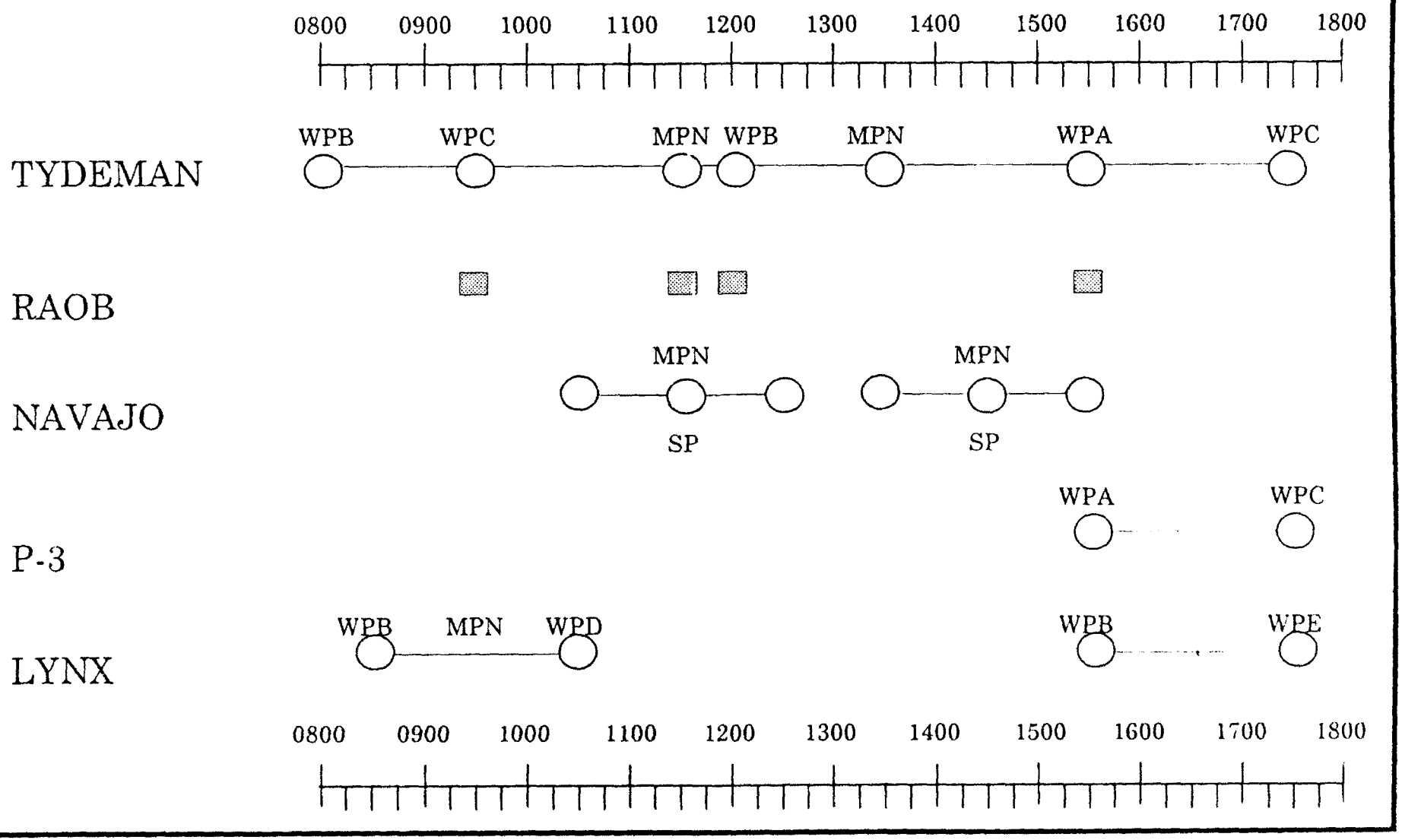


TABLE B15.

MAPTIP BLOCK B TEST SCHEDULE (1430-2400 MET)

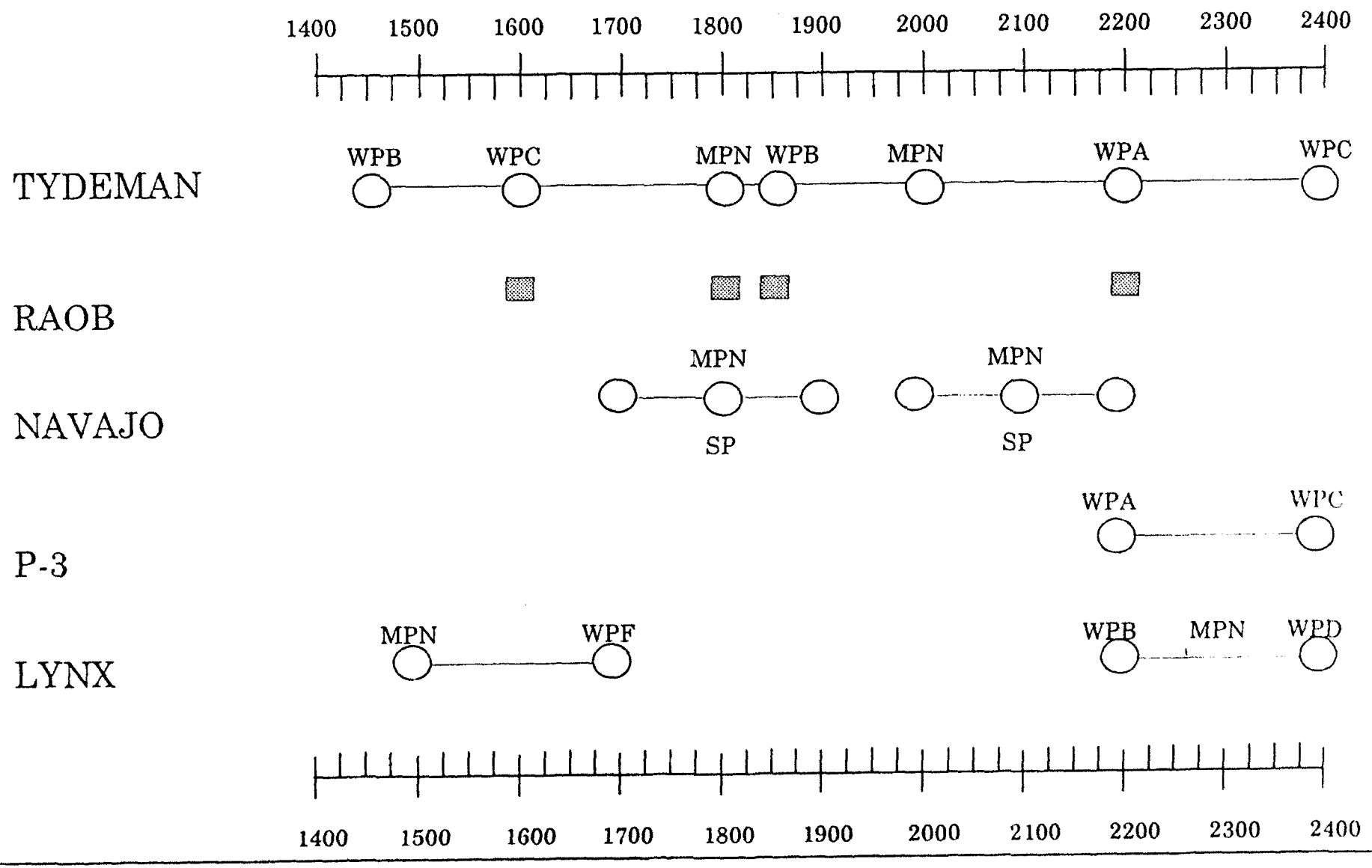


TABLE B16.

MAPTIP BLOCK C TEST SCHEDULE (0700 - 1300 MET)

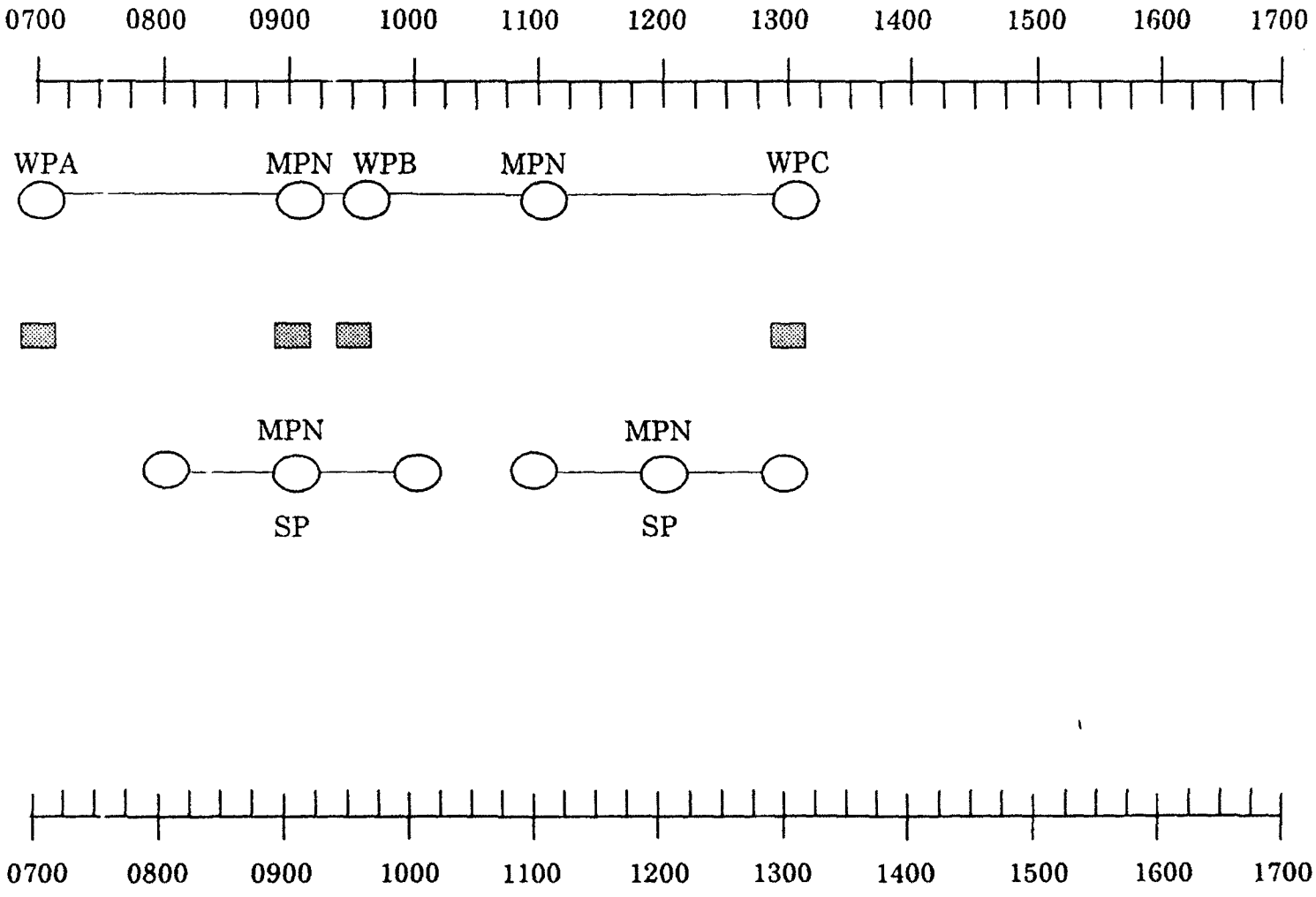


TABLE B17.

MAPTIP BLOCK C TEST SCHEDULE (1300 - 1900 MET)

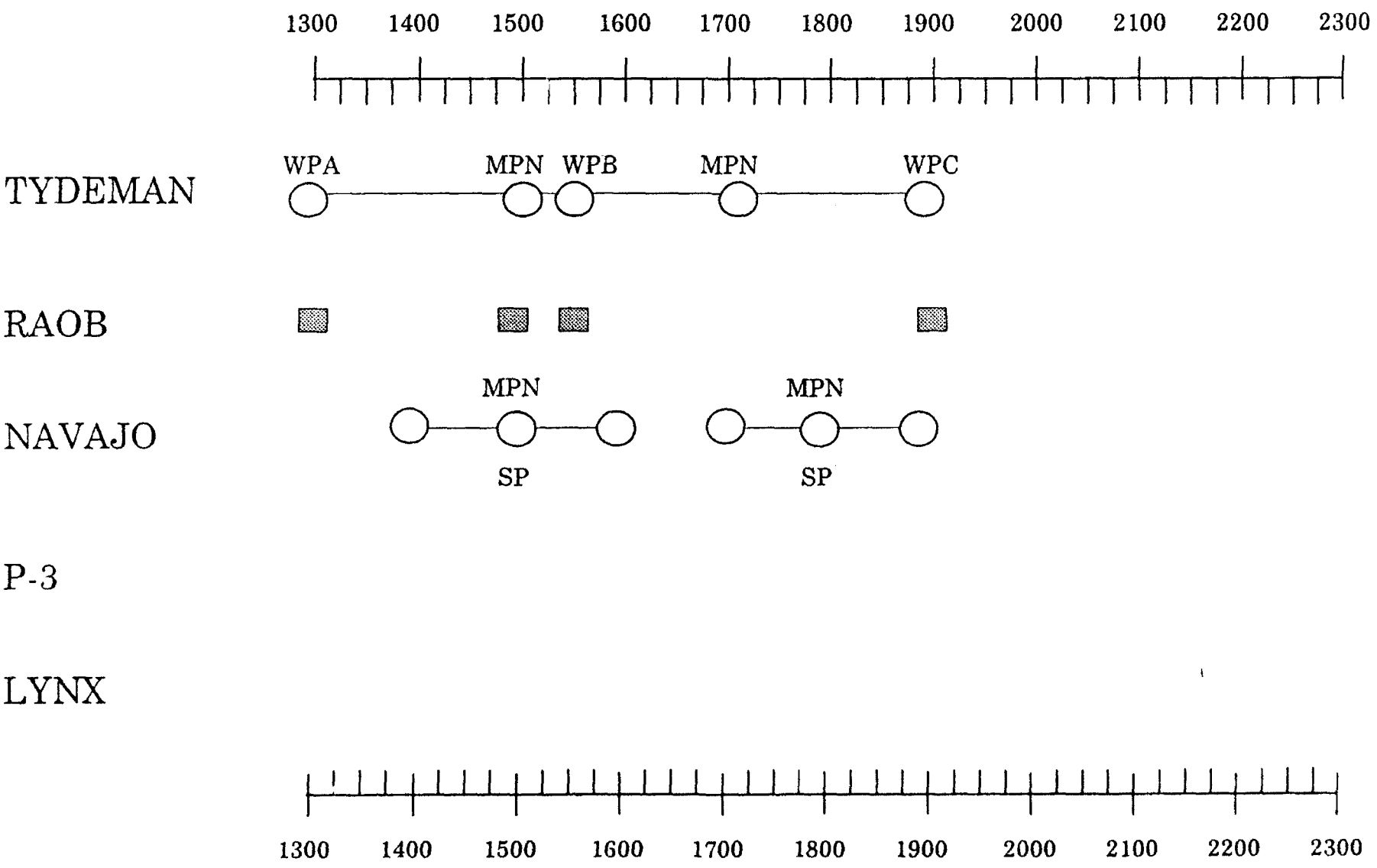


TABLE B18.

LYNX HELICOPTER FLIGHT PLAN

BLOCK A (EARLY MORNING)

Time	Activity
1130 - 1150	Imaging Tydeman
1150 - 1330	Target WPB - MPN - WPD

BLOCK A (DAYTIME)

Time	Activity
0930 - 0950	Imaging Tydeman
0950 - 1130	Target WPB - MPN - WPD
1530 - 1550	Imaging Tydeman
1550 - 1730	Target WPB - MPN - WPD

BLOCK B (EARLY MORNING)

Time	Activity
1130 - 1150	Imaging Tydeman
1150 - 1330	Target WPB - MPN - WPD

BLOCK B (DAYTIME)

Time	Activity
0830 - 0850	Imaging Tydeman
0850 - 1030	Target WPB - MPN - WPD
1530 - 1550	Imaging Tydeman
1550 - 1730	Target WPB - WPE

BLOCK B (EVENING)

Time	Activity
1500 - 1520	Imaging Tydeman
1520 - 1700	Target MPN - WPF
2200 - 2220	Imaging Tydeman
2220 - 2400	Target WPB - MPN - WPD

TABLE B19. LYNX FLIGHT PLAN

Radial from MPN on 250° to WPF (MPN - WPF)

Stop	Pos (North)	Pos (East)	Dist Fr. MPN [Nmi]	Elevation [ft]
1	52° 16' 16"	04° 17' 00"	0.5	100 265
2	52° 15' 35"	04° 13' 56"	2.5	100 1325
3	52° 14' 43"	04° 10' 06"	5.0	100 2650
4	52° 13' 52"	04° 06' 16"	7.5	100 3980
5	52° 13' 00"	04° 02' 26"	10.0	100 5300
6	52° 11' 37"	03° 15' 18"	14.0	100

Radial from Beach Station on 250° to WPE (WPB - WPE)

Stop	Pos N	Pos E	Dist Fr. WPB [Nmi]	Elevation [ft]
1	52° 11' 42"	04° 22' 12"	0.5	100 265
2	52° 11' 01"	04° 19' 08"	2.5	100 1325
3	52° 10' 19"	04° 16' 04"	4.5	100 2390
4	52° 09' 28"	04° 12' 15"	7.0	100 3715
5	52° 08' 47"	04° 09' 11"	9.0	100 4775
6	52° 07' 55"	04° 05' 22"	11.5	100
7	52° 07' 03"	04° 01' 33"	14.0	100

TABLE B19 CONTINUED. **LYNX FLIGHT PLAN (CONTINUED)**

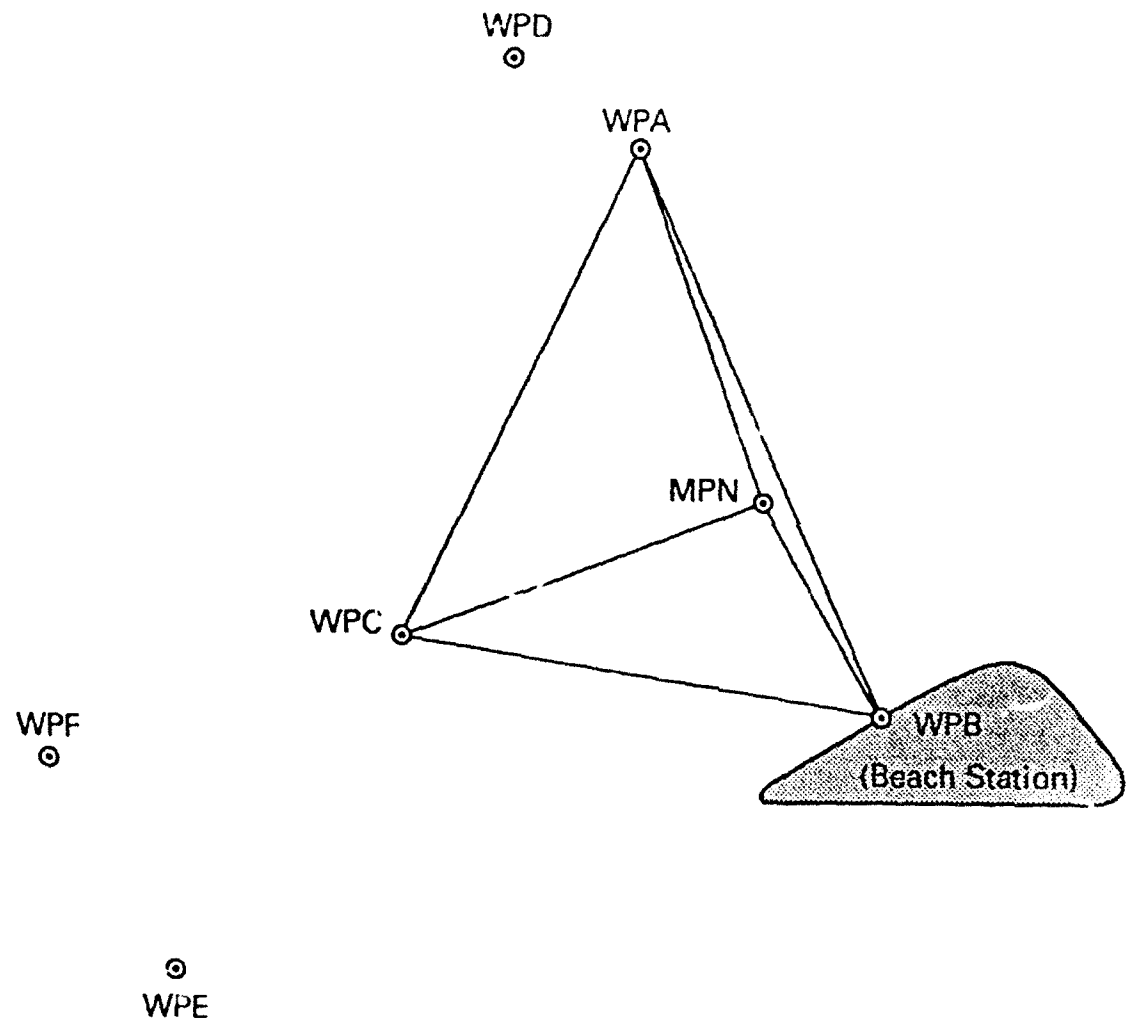
Radial from Beach Station to MPN to WPD (WPB - MPN - WPD)

Stop	Pos N	Pos E	Dist Fr. MPN [Nmi]	Elevation [ft]
1	52° 12' 20"	04° 22' 27"	-5.0	100 319
2	52° 13' 59"	04° 20' 35"	-3.0	100
3	52° 15' 37"	04° 18' 42"	-1.0	100 2445
4	52° 16' 51"	04° 17' 18"	0.5	100 265
5	52° 18' 29"	04° 15' 25"	2.5	100
6	52° 20' 32"	04° 13' 04"	5.0	100 2658 5635
7	52° 22' 34"	04° 10' 43"	7.5	100
8	52° 24' 37"	04° 08' 22"	10.0	100 5300
9	52° 27' 53"	04° 04' 35"	14.0	100

TABLE B20. **P3 FLIGHT PLAN**

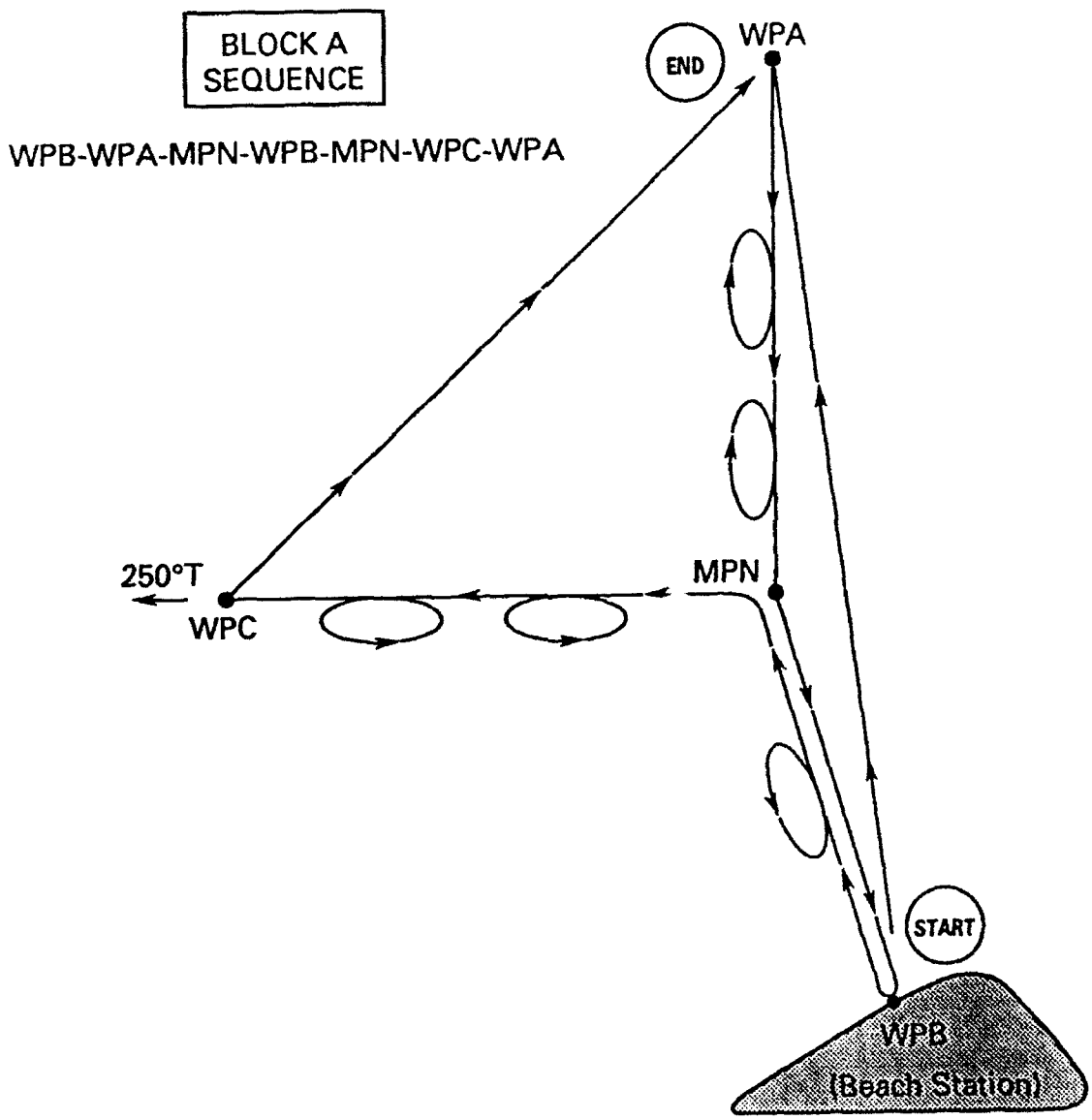
BLOCK	TIME (MET)	DETECTION/IDENTIFICATION
A (0400-1330 MET)	1130 - 1330	WPC - WPA
A (0900-1830 MET)	1630 - 1830	WPC - WPA
B (0400-1330 MET)	1130 - 1330	WPA - WPC
B (0800-1730 MET)	1530 - 1730	WPA - WPC
B (1430-2400 MET)	2200 - 2400	WPA - WPC

FIRUGE B1. Geographical layout for the MAPTIP way points.



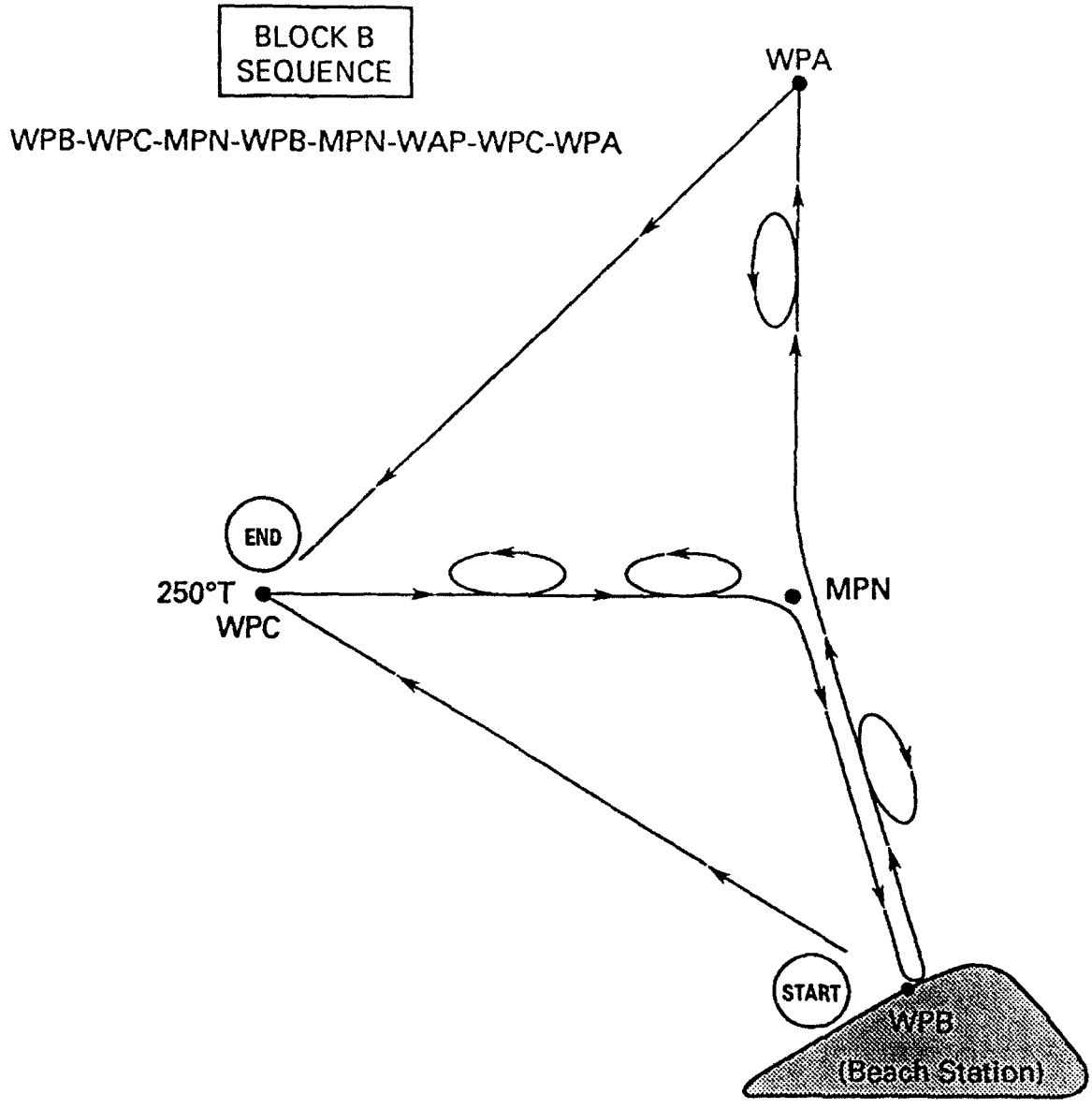
C0816-1.54

FIGURE B2. Operational Block A.



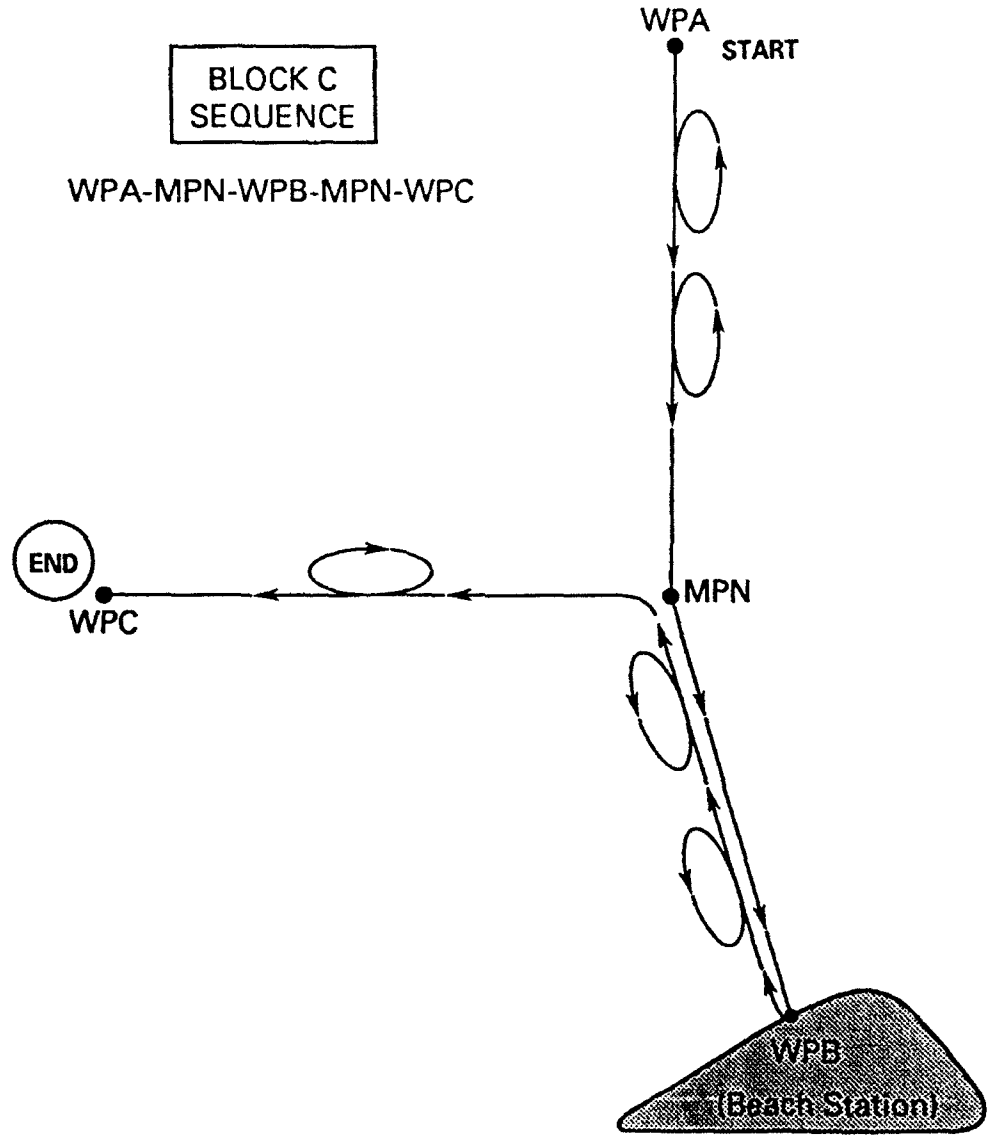
C0816-2.54

FIGURE B3. Operational Block B.



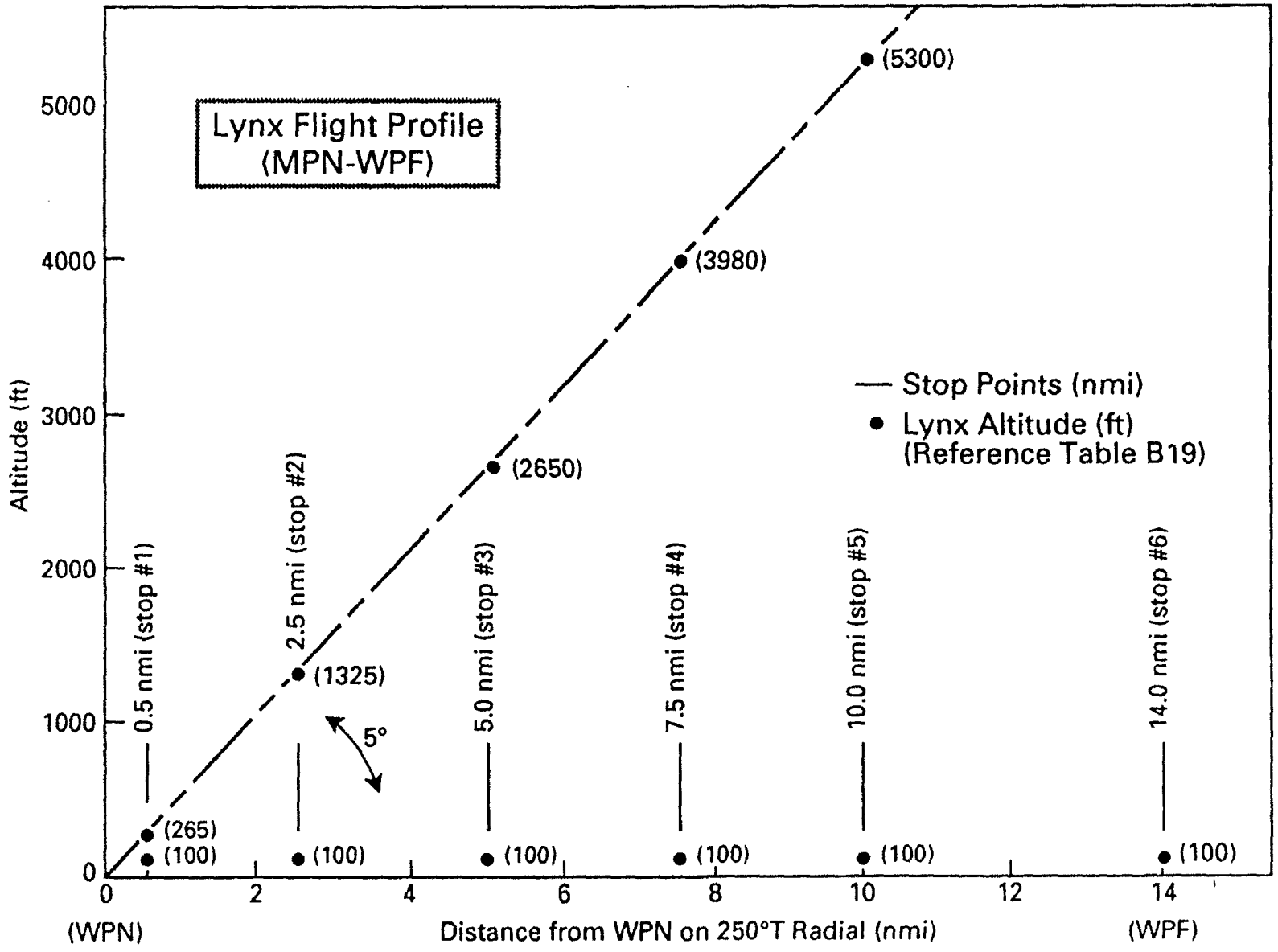
C0816-3.54

FIGURE B4. Operational Block C.



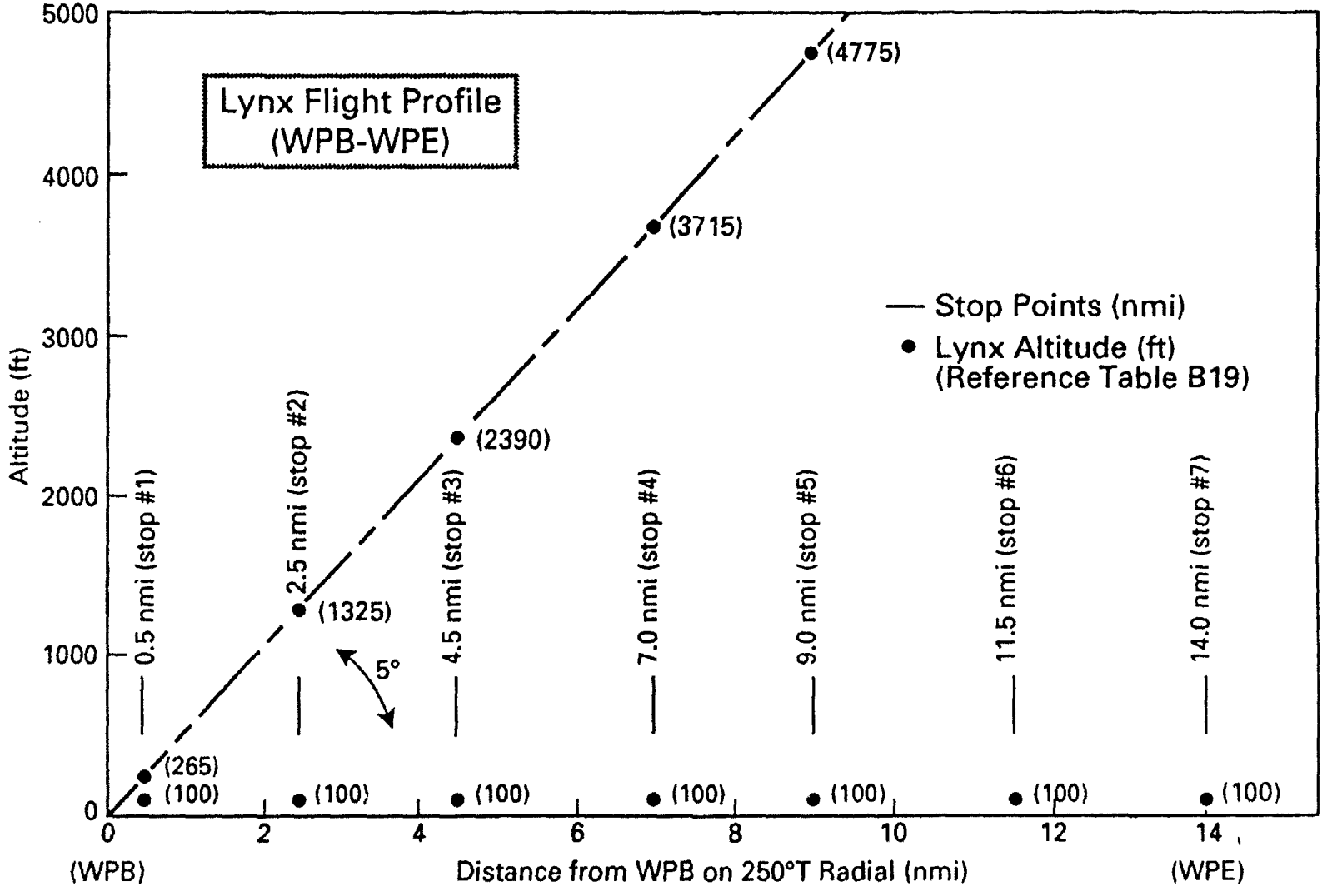
C0816-4.54

FIGURE B5.



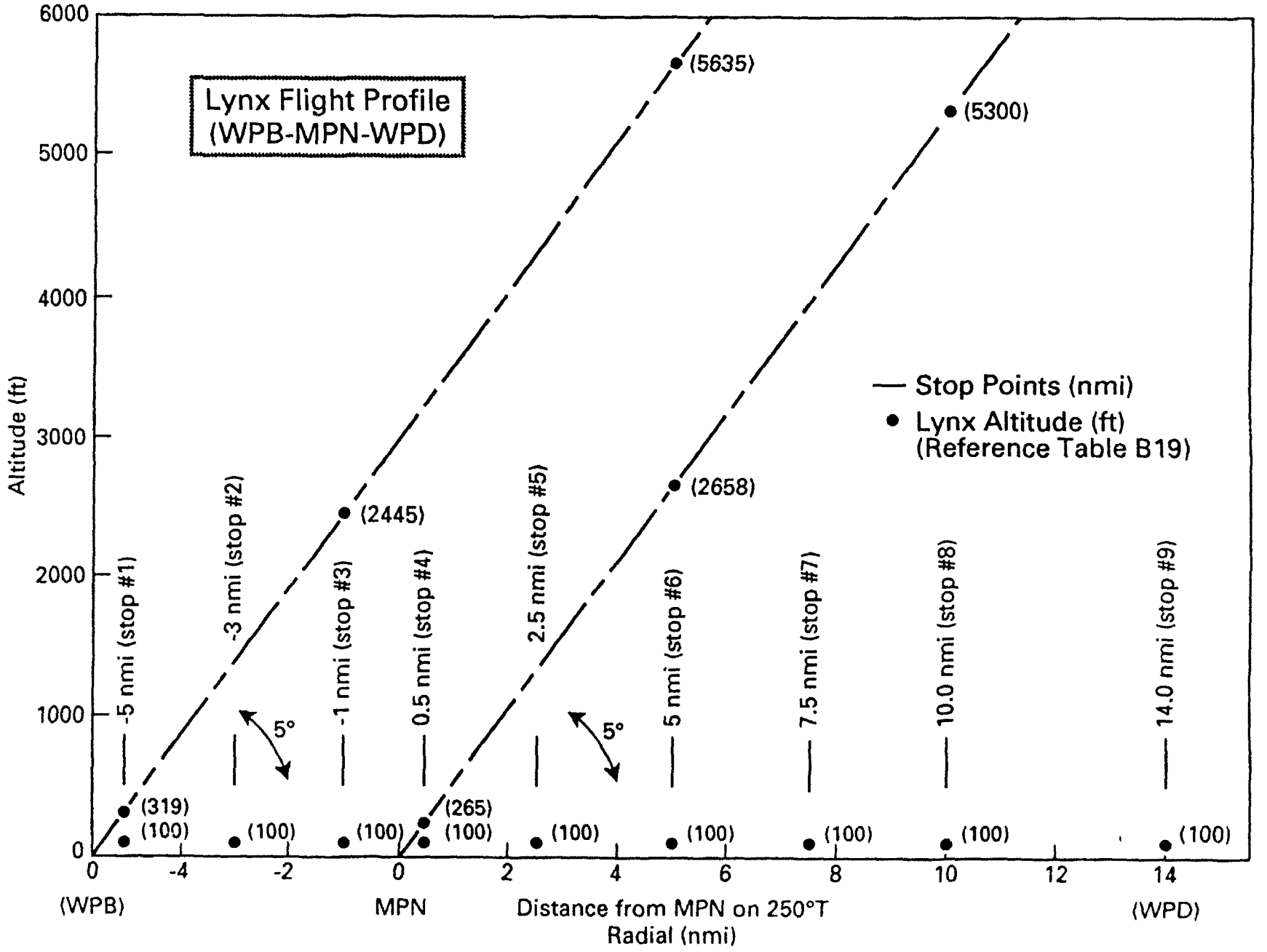
C0816-5.54

FIGURE B6.



C0816-6.54

FIGURE B7.



C0816-7.54

APPENDIX C

REQUESTED FREQUENCY AUTHORIZATION

ROUTINE

****
* U N C L A S S I F I E D *
****

RTTUZYUW RUWDOAA1900 0261900-UUUU--RUWFSUU.
ZNR UUUUU
R 261900Z JAN 93 ZYB
FM NCCOSC RDTE DIV SAN DIEGO CA//0062//
TO NAVEMSCEN WASHINGTON DC//32//
BT
UNCLAS //N02410//
MSGID/GENADMIN/NCCOSC RDTE DIV 0062//
SUBJ/TEMPORARY FREQUENCY ASSIGNMENT REQUEST-USN//
RMKS/1. THIS TEMPORARY FREQUENCY ASSIGNMENT REQUEST IS SUBMITTED FOR THE OPERATION OF GND/CIVILIAN(NAVAJO) ACFT TWO WAY VOICE COMMUNICATION(COMM) LINKS UTILIZING ONE FREQUENCY IN EACH OF THE FOLLOWING BANDS: VHF MILITARY BAND(PARTS 1 AND 2),VHF CIVILIAN BAND(PARTS 3 AND 4), AND UHF MILITARY BAND(PARTS 5 AND 6).
2. PART 1-GND/ACFT COMM LINK IN THE MILITARY VHF BAND
005. U
010. N
102. NCCOSC RECORD NO 1
110A. M142.000 110B. 142.050 110C. M142.075 110D. M142.100 110E. M142.775 110F. M142.800 110G. M143.600
113. FA/MA
114. 16K0F3E/16K0F3E
115. W10/W10
140. 931004
141. 931112
144. O
200. USN
207. NCCOSC RDTE DIV SAN DIEGO CA
208. N66001
209. NFC WUS
300. NETHERLANDS
301. THE HAGUE
303. 521626N0041746E
340. C,MOT P33DEN/C,MOT P1334AM/C,MOT H43SSU3140/C,MOT H99SS 007H
400. NORTH SEA
401. ACFT
403. 521626N0041746E
406. 32.2 KILOMETERS
440. C,MOT P33DEN/C,MOT P1334AM/C,MOT H43SSU3140/C,MOT H99SS 007H
502. FREQUENCIES REQUIRED FOR GND/CIVILIAN ACFT VOICE COMM LINK TO

DELIVER TO:
FM NCCOSC RDTE DIV SAN DIEGO CA//0062//

****
TOR:281831Z JAN 93 * U N C L A S S I F I E D *
****

DA190002

R090[illegible]Z [illegible]
ROUTINE ★ U N C L A S S I F I E D ★
★★★★★★★★★★★★★★★★★★★★★★★★

COORDINATE A RDT AND E PROJECT INVOLVING 8 NATO COUNTRIES.
520. THE AERONAUTICAL BASE STATIONS(FA) WILL BE LOCATED ON THE MEET POST NOORDWYK TOWER(521626N0041746E) AND BEACH(521253N0042409E) OFF THE COAST OF THE HAGUE. THE RADIOS ARE SET TO THE FREQUENCIES REQUESTED IN ITEMS 110A THRU 110G, HOWEVER, IF NONE OF THE FREQUENCIES ARE AVAILABLE IN ITEMS 110A THRU 110G, THEN ONE OR MORE FREQUENCIES IN THE 138-150 MHZ BAND WOULD BE ACCEPTABLE. THE 8 NATO COUNTRIES ARE: UNITED STATES, CANADA, ENGLAND, FRANCE, NETHERLANDS, GERMANY, DENMARK, AND NORWAY.
800. [illegible] FOR NCCOSC RDT&E DIV [illegible] DOUGLAS JENSEN, CODE 543, (619)553-1415, DSN 553-1415. FREQUENCY COORDINATOR FOR NCCOSC RDTE DIV IS FRANK KIRTMAN, CODE 0062, (619)553-7461, DSN 553-7461.
3. PART 2-GND/ACFT COMM LINK IN THE MILITARY VHF BAND
005. U
010. C,NCCOSC RECORD NO 1
110A. M142.000 110B. M142.050 110C. M142.075 110D. M142.100
110E. M142.775 110F. M143.800 110G. M143.650
300. NETHERLANDS
301. THE HAGUE
303. 521253N0042409E
400. NORTH SEA
401. ACFT
403. 521253N0042409E
406. 32.2 KILOMETERS
4. PART 3-GND/ACFT COMM LINK IN THE CIVILIAN VHF BAND
005. U
010. C,NCCOSC RECORD NO 1
110. M135.35 OR ONE FREQUENCY IN THE M118.000-135.975 BAND
114. 6K00A3E/6K00A3E
115. W5/W5
300. NETHERLANDS
301. THE HAGUE
303. 521626N0041746E
340. C,TERRA TX 720
400. NORTH SEA
401. ACFT
403. 521626N0041746E
406. 32.2 KILOMETERS
440. C,TERRA TX 720
5. PART 4-GND/ACFT COMM LINK IN THE CIVILIAN VHF BAND
005. U
010. C,NCCOSC RECORD NO 1
110. M135.35 OR ONE FREQUENCY IN THE M118.000-135.975 BAND
114. 6K00A3E/6K00A3E
115. W5/W5
300. NETHERLANDS
301. THE HAGUE
303. 521253N0042409E
340. C,TERRA TX 720

★★★★★★★★★★★★★★★★★★★★★★★★
TOR:[illegible]Z JAN 93 ★ U N C L A S S I F I E D ★
★★★★★★★★★★★★★★★★★★★★★★★★

400. NORTH SEA
401. ACET
403. 521253N0042409E
406. 32.2 KILOMETERS
440. C,TERRA TX 720
6. PART 5-GND/ACET COMM LINK IN THE MILITARY UHF BAND
005. U
010. C,NCCOSC RECORD NO 1
110. ONE FREQUENCY IN THE 225-400 MHZ BAND
114. 6K00A3E/6K00A3E
115. W30/W30
300. NETHERLANDS
301. THE HAGUE
303. 521626N0041746E
340. C,MAG RT-1168/ARC-164(V)
400. NORTH SEA
401. ACET
403. 521626N0041746E
406. 32.2 KILOMETERS
440. C,MAG RT-1168/ARC-164(V)
7. PART 6-GND/ACET COMM LINK IN THE MILITARY UHF BAND
005. U
010. C,NCCOSC RECORD NO 1
110. ONE FREQUENCY IN THE 225-400 MHZ BAND (Assigned 283.825 MHZ)
114. 6K00A3E/6K00A3E
115. W30/W30
300. NETHERLANDS
301. THE HAGUE
303. 521253N0042409E
340. C,MAG RT-1168/ARC-164(V)
400. NORTH SEA
401. ACET
403. 521253N0042409E
406. 32.2 KILOMETERS
440. C,MAG RT-1168/ARC-164(V)//
BT
#1900

UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
U U N C L A S S I F I E D U
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

RTTUZYUW RUFHNAA3206 2151639-UUXX--RULSNDW.
ZNR UUUXX ZZH
R 031639Z AUG 93 PSN 662049M27
FM USCINCEUR FMFO BRUSSELS
TO RHDLCNE/CINCUSNAVEUR LONDON UK//N613//
INFO RXFCNHQ/ARFA BRUSSELS BE
RNFADS/NARFA NL
RULSNDW/NAVEMSCEN WASHINGTON DC//32//
RHFQAAA/HQUSAFE RAMSTEIN AB GE//SCMXF//
RHFFWMS/CDR5THSIGCMD WORMS GE//ASQE-OP-OF//
RUSNTCA/USCINCEUR VAIHINGEN GE//ECJ6-DF//
RUFHOL/USCINCEUR FMFO BONN GE
BT
UNCLAS BRUSSELS
UNCLASSIFIED
RELEASABLE TO NATO AS NATO UNCLASSIFIED
SIC SPA
SUBJECT: TEMPORARY FREQUENCY ASSIGNMENT - NA93-017
REFS: A. NAVEMSCEN//051230Z MAY 93
B. CINCUSNAVEUR FAX TO FMFO BRU, 6 MAY 93
C. USMBR/481/NA93-017, 19 MAY 93 (VHF-FM)
D. USMBR/484/NA93-017B, 19 MAY 93 (UHF-AM)
E. ARFA(0)-C(93)-0866M/SPA/362/SPA/EAE/55/93//
101432Z JUN 93 (UHF-AM)
F. RNLAF OPS//JCEB/AFZ-AF/X-99/9307//110620Z
JUN 93
G. FMFO BRU//151439Z JUN 93
H. FMFO BRU//231951Z JUL 93
I. RNLAF//291120Z JUL 93
J. RNLA//DOKL/CIV//300820Z JUL 93
IRT REF A, REFS E/F/I/J AGREE TO USE OF THE FOLLOWING
FREQS AS INDICATED BELOW.
(1) VHF-FM (NON-INTERFERENCE-BASIS ONLY)
M142.050 RPT M142.050
M142.075 RPT M142.075
M143.650 RPT M143.650
M142.800 RPT M142.800
(2) VHF-AM
M126.675 RPT M126.675
CONDITIONS BELOW APPLY:
A. ONLY FOR USE INSIDE NETHERLANDS AIRSPACE BETWEEN
THE FOLLOWING COORDINATES:
0200E5130N/0500E6500N/0630E5500N/0630E5340N/0713E5314N
0704E5214N/0613E5124N/0603E5048N/0540E5048N/0550E5111N
0458E5126N/0454E5124N/0428E5126N/0400E5113N/0326E5116N

UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
U U N C L A S S I F I E D U
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
U U N C L A S S I F I E D U
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

0200E5130N
B. MAXIMUM FLIGHT LEVEL 200 (TWO ZERO ZERO)
THIS ASSIGNMENT IS ONLY VALID DURING PERIOD 04 OCTOBER
THRU 12 NOVEMBER 1993 AND PROLONGATION CAN NOT BE
GRANTED. ASSIGNMENT HAS BEEN COORDINATED WITH CIVIL AIR
TRAFFIC CONTROL ORGANIZATION.
(3) UHF-AM)
M283.825 RPT M283.825
CASE CLOSED.
POC IS MR. DON MURPHY/ETS 366-7283/IVSN 255-5885
BT
#3206
NNNN
DLVR:NAVEMSCEN WASHINGTON DC(1)...INFO
RTD:000-000/COPIES:

*** MDS office codes that have received this message: ***

00	00A	10	111	112
113	114	20	211	213
30	31	311	312	313
32	321	322	323	325
32G	40	41	411	412
42	421	422	MDSOPR	SYSMGR

2 OF 2

UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
U U N C L A S S I F I E D U
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU

APPENDIX D

MAPTIP PARTICIPANT DAILY LOG

MAPTIP PARTICIPANT DAILY LOG

DATE: _____

NATO PARTICIPANT: __ _____

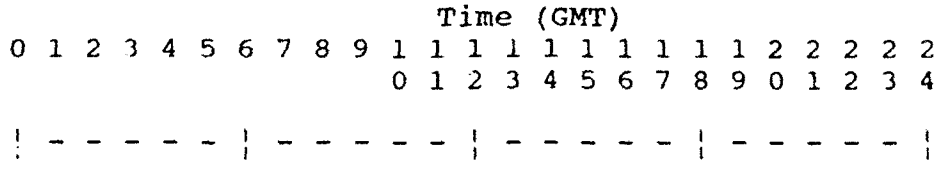
Instrument: _____

Location: _____

Operational Procedure (Calibration, routine measurement):

Type of Observation (Continuous, intermittent, frequency of sampling, etc.):

Operational Time Period (GMT):



(Fill in with red line)

Operational Success:

Comments (Problem, data quality, reliability, etc):

APPENDIX E

MAPTIP PLATFORM QUICK LOOK DAILY LOG

MAPTIP PLATFORM QUICK LOOK DAILY LOG

DATE: _____

PLATFORM: _____ (MPN, Beach, Tydeman, etc.)

Parameter Measured	Time (GMT) 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Aerosols																									
UK (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
US (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
US (AIR)																									
NL (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL (SHIP)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FR (BEACH)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ROTORODS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radon (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CN (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lidar (MPN)																									
NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
US	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Radiosonde	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FSM (10.6μm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Visibility	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Transmissometer																									
NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Comparitive Transmissometer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Turbulence Pkg.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IR Imaging																									
DK (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CA (BEACH)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GE (BEACH)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NO (BEACH)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL (LYNX)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NL (P-3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
US (MPN)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
US (BEACH)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

IR Targets				
CA (MPN)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
CA (SHIP)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
NL (MPN)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
NL (SHIP)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
NL (LYNX)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
US (AIR)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
GE (MPN)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Spectral Rad	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Video (VHS)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Aerosol Chem.	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Met. Stations (AT, RH, Pr, SST, Winds)				
GE (Beach)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
NL (MPN)	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Buoy Systems				
FR	- - - - - -	- - - - - -	- - - - - -	- - - - - -
US	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Friction Vel	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Salinity	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Rain Rate	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Solar Irr	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Wave Info	- - - - - -	- - - - - -	- - - - - -	- - - - - -
Aethalometer	- - - - - -	- - - - - -	- - - - - -	- - - - - -

APPENDIX F

INSTRUMENTATION

AND

PERSONNEL SUMMARY

COMMITTED INSTRUMENTATION FOR MAPTIP (RSG.8 (*) & RSG.5 (+))

	CA	DK	FR	GE	NL	NO	UK	USN
Knollenbergs			*		*		*	*
Rotcrods					*			*
Radon Counter							*	*
Condensation Nuclei								*
Lidar				*	*			*
Radiosondes					*			
AT, Q, & Vis (z)[1]					* SL			* BL
FSM @ 10 & 3.75 micron	*							
Visibility	*		*		*			
Transmisso-meter				*	+[3]			*[4]
Turbulence (u_*)					*		+	+
IR Imaging	*	*		*	+	*		+
IR Sources (Calibrated)				*		*		*
IR Targets[2]	*			+	+			*
Buoy Systems			*					*
Wave Info			*		*			*
Satellite SST			*					
Radiometer SST								*
Met Station				*	*			
Spectral Radiometry				*				
Aerosol Comp					*		*	
Laser Ranger						*		
VHS Video							*	

[1] SL = surface layer, BL = boundary layer.
[2] Platform & Ship as targets as well. [3] 3-5 & 8-12 μm. [4] 3-5 & 8-12 μm Comparitive Transmissiometer.

TENTATIVE LOCATION (PLATFORM) FOR EQUIPMENT

	MPN	TYDEMAN	BEACH	AIRBORNE	BUOYS
Knollenbergs	USN,UK, NL	NL	FR	USN	
Rotorods	NL, USN				
Radon Counter	USN	UK			
Condensation Nuclei	USN	NL			
Lidar	USN, NL		GE, NO		
Radiosondes		NL			
AT, Q, Vis (z)	NL			USN	
FSM @ 10 microns	CA				
Visibility	CA, NL		FR		
Transmisso-meter	NL		GE, NL, USN		
Turbulence (u_*)	NL, UK				UK, USN
IR Imaging	NL, USN, DK		USN, CA, NO, GE, RSG5	NL	
IR Sources (Calibrated)	GE, NL	NL	GE, NO	NL	
IR Targets	CA, NL, GE, USN	CA, NL		NL, USN	
Buoy Systems					USN, FR
Platforms	NL			USN	
Wave Info	USN, NL		FR		
Satellite SST			FR		
Radiometer SST				USN	
Met Station	NL	NL	GE	USN	
Spectral Radiometry			GE		
VHS Video	UK				
Laser Ranger			NO		
Aerosol Comp	UK	NL			

ENVIRONMENTAL PARAMETERS TO BE RECORDED DURING MAPTIP

	MPN	BUOYS	SHIP	AIR	BEACH SITE	TNO	NAS
Air Temperature	*z[1]	FR,US	*	*z	*		
Relative Humidity	*z	FR,US	*	*z	*		
Pressure	*		*	*z	*		
Sea Surface Temp.	*	FR,US	*	*			
Wind Speed	*	FR,US	*		*		
Wind Direction	*	FR,US	*		*		
Friction Velocity	*	US					
Salinity			*				
Rain Rate	*				*		
Solar Irradiation	*		*		*		
Wave Height	*	FR,US					
Wave Period	*	FR,US					
Weather Forecast							*
Weather Maps							*
Air Mass Traj.						*	
Station Met Obs.							*
Transmission	*TR[2]				*RCV		
Sea & Sky background	*						
Visibility	*		?		*		

[1] "z" denotes parameters that will be measured as a function of height. [2] TR denotes transmitter and RCV the reveiver.

AEROSOL INSTRUMENTATION AND TENTATIVE LOCATION (PLATFORM)

	MPN	SHIP	AIR	BEACH SITE
FSSP-100 & OAP-230X (0.5-300 MICRONS)	UK[1]			
ASASP-X (0.1-3.0 MICRONS)	UK			
ASSP (0.5-30 MICRONS)	US[2]			
FSSP-100 & OAP-200X (0.5-300 MICRONS)			US	
CSASP-100 (0.2-20 μm) & CSAS-100HV (0.5-47 μm)	NL[3]			
ASAS-300A (0.16-3.0 μm) & CSAS-100HV (0.5-32 μm)		NL		
CSASP-100 (0.5-47 μm) & ASASP-X (0.09-3 μm)				FR[4]
ROTORODS (10-300 MICRONS)	NL[3], US[3]			

1 (To Be Assigned)

2 Probes on Meetbordes Platform, Instrumentation in Bergruimte (back up in Werkplaats).

3 MPN Boom and Instrumentation in Werkplaats.

4 Upstairs at Beach Station, Probles located on station roof.

IR IMAGING INSTRUMENTATION AND TENTATIVE LOCATION (PLATFORM)

	MPN	TYDE-MAN	NAV-AJO	LYNX	P3	BEACH SITE
3-5 Micron AMBER & 8-12 Micron AN/TAS 4b Array Detector Cameras	DK1					-
Visible Camera						CA[2]
3-5 Micron Thermal Imager						CA[2]
3-5 & 8-12 Thermal Imager (DUWIR)						GE[3]
3-5 & 8-12 AGA Thermal Imager						US[4]
InSi Focal Plan Array Camera (4.5-4.7 micron)						GE[3]
3-5 & 8-12 Imager (TICM II)						NO[4]
8-12 Imager	NL[1]			NL	NL	
Kodak PtSi 3-5 Imager (ONR)	US[5]					
IR target (NAVAJO)			USN			
900 K IR target modulated 1 kHz	NL					
IR target (LYNX and High Temp Source)				NL		
IR/Tungsten High Temp Source (Stern Looking)		NL				
IR Calibrated target (Low temp source)	GE					
Broadband IR Source	USN					
IR Targets (Halogen)	CA[6]	CA[7]				

[1] MPN Helo Pad. [2] Beach Station Top Floor. [3] Beach Station Beach Containers. [4] Beach Station Bottom Floor. [5] MPN Meetkamer 4 and Bergruimte (back up on Helo Pad). [6] Line of 3 Halogen lamps in diagonal line. [7] 3-4 Halogen lamps at different heights.

PLATFORM PERSONNEL INVOLVED IN MAPTIP

	CA	DK	FR	GE	NL	NO	UK	USN	Σ
MPN (max 16)	1*	2			3 1+		2	2 4-5+	15-16
Tydeman					1				1
Beach Station	2-4		2	6-7	1	2		3-4	16-20
NCCOSC Platform								1-2	1-2
Σ	3-5	2	2	6-7	6	2	2	7-9	33-39

* All entrees are RSG.8 personnel unless otherwise indicated.
+ RSG.5 Personnel.

TENTIVE PLATFORM SPACE ASSIGNMENTS
(FOR MPN ONLY)

	MPN
DK (IMAGING)	HELO DECK
CA (VISIBILITY)	BOOM ???? + MEETKAMER 4
CA (TARGETS)	X
GE (POINT SOURCE)	HELO DECK METEO MAST
NL (TRANSMISSION)	15 M DECK
NL (IMAGING)	HELO DECK
NL (TARGETS)	X
NL (LIDAR)	SW-CORNER & ENTREE
NL (AEROSOLS)	MPN BOOM & WERKPLAATS
US (IMAGING)	ENTREE & BERGRUIMTE
US (AEROSOLS)	MEETBORDES PLATFORM & BERGRIUMTE
US (BUOY)	100 M FROM MPN
UK (TURBULENCE)	HELO-DECK OR BOOM ????
UK (AEROSOLS)	SW-CORNER & HAL / MEETKAMER 4
FR (BOUYS)	5 KM FROM MPN ON RADIAL TO BEACH STAT.
NL & US ROTORODS (AEROSOLS)	WERKPLAATS

TENTATIVE PLATFORM SPACE ASSIGNMENTS
(NOT FOR MPN)

	BEACH STATION	TYDEMAN	LYNX	P-3	NAVAJO
CA (IMAGING)	BOTTOM FLOOR				
CA (TARGETS)		X			
GE (IMAGING)	PARKING LOT				
GE(WHITE CELL)	GARAGE				
GE(MET STATION)	ROOF				
NO (IMAGING AND RANGER)	BOTTOM FLOOR				
NL (AEROSOLS)		X			
USN (IMAGING)	CONCRETE PAD (BOTTOM FL)				
NL (IMAGING)			X	X	
NL (TRANSMISSION)	TOP FLOOR				
NL (TARGETS)		X	X		
US (TARGETS)					X
US (AEROSOLS)					X
US (COMPARATIVE TRANSMISSOMETER	CONCRETE PAD (BOTTOM FL)				
FR (AEROSOLS)	TOP FLOOR & ROOF				

APPENDIX G

NOVASTOR SOFTWARE INFORMATION

Facsimile Cover Page

novastor®
CORPORATION

From:

Sender: Lew Whitaker
Phone: (818)707-9900
Fax: (818)707-9902
Sent:

To:

Company: Questec
Phone:
Fax: 17037601061
Bill:

Please deliver to:

Bart Long

Pages: 4

Message:

APPENDIX G

NOVASTOR SOFTWARE INFORMATION

NovaTar

DOS, OS/2 to Unix TAR Data Interchange

●4mm DAT ●8mm Tape Drives ●1/4" Tape Drives ●9 Track ●3480 Compatible●

NovaTar

What is NovaTar?

NovaTar is a DOS or OS/2 appliation that allows users to easily move files between PC's and any Unix machines (SUN, RS/6000, SCO, SGI etc.), using UNIX TAR data format as the standard. Database files, graphic files, and text files all can be transferred between operating systems. NovaTar can be run from the command line or from a menu. This allows users a great deal of flexibility in using NovaTar.

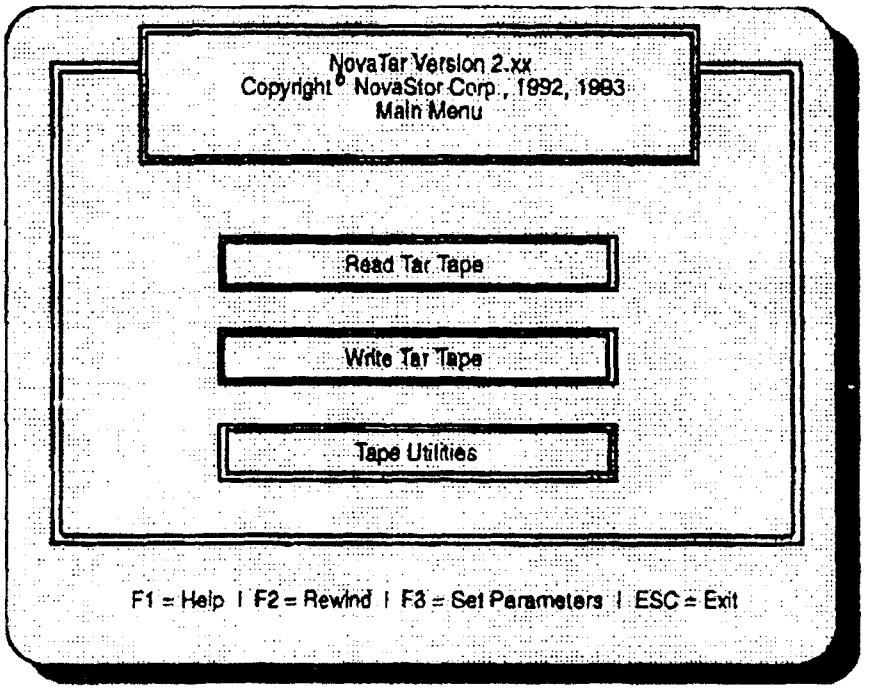
What Is TAR?

TAR (Tape Archive/Restore) is a Unix utility that is used to ccreate backup tapes on Unix computers. This program was originally created to provide data security in the event of a disk failure. It has become a standard for moving files between different computers (Data Interchange).

What NovaTar can do for you:

NovaTar understands the file structures for both Unix and DOS environments, making transfers and conversions simple and straight forward. Save time by creating and manipulating data in the programs and operating system of your choice, and feel good knowing you can take your data, lists, or graphic files and move them between operating systems.

NovaTar also offers the ability to summarize tape files and TAR sets, append data to existing TAR sets, preserve or change paths, and support of Unix right permissions. NovaTar facilitates tape handling functions, such as setting the tape position to specific files or blocks, rewinding, erasing tape, tape marks, and displays tape blocks for easy block identification.



NovaWare Software - Software for the Information Age

Ask about other NovaStor Software products - From the people who know tape!

•NovaBack •NovaMac •Tape Processing Utilities •Data Conversion Utilities •NovaNet •NovaTar •QuTape •

NovaTar

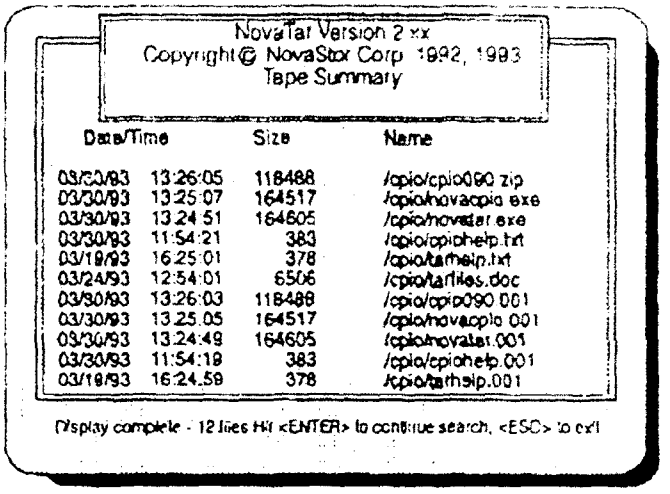
DOS, OS/2 to Unix TAR Data Interchange

●4mm DAT ●8mm Tape Drives ●1/4" Tape Drives ●9 Track ●3480 Compatible●

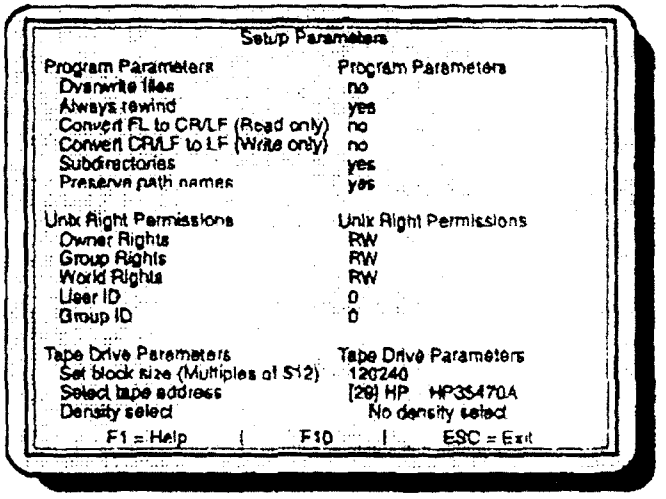
NovaTar

NovaTar Features

- Write multiple TAR sets on a single Tape.
- Summarize TAR tapes.
- Preserve path names when writing or reading a TAR tape
- Dos wildcard characters for selection of multiple files.
- "TAR-like" Command line support.
- Supports all tape drive modes.
- Customize Input/Output path names
- Append multipe data sets on a single tape.
- Supports over 25 SCSI Host Adapters
- Supports Unix right permissions
- Converts LF to CR/LF (Read Only)
- Converts CR/LF to LF (Write Only)
- Includes tape hardware and software diagnostic utilities



When it comes to tape processing, data extraction or manipulation, over and across multiple operating platforms, you can count on NovaStor, the tape people.



Where can I get NovaTar?

NovaTar from NovaStor is available through a wide network of dealers and distributors throughout the United States, Canada and Internationally. Call NovaStor or your local dealer for more information about NovaTar and other tape utility software.

NovaWare Software - Software for the Information Age

30961 Agoura Rd. Suite 109, Westlake Village, California 91361
Ph. (818) 707-9900 Fax: (818) 707-9902 Tech Direct (818) 879-4878

NovaBack

YOUR CHOICE

NovaRack, NovaStor's Backup/Restore software keeps basic operation and standards simple and straight forward, yet offers users a multitude of options to choose from while running program. Among the many features and options included are:

- **Easy Installation and Automatic Configuration**
- **Hot Keys for Easy Keyboard Control**
- **Full Mouse Support**
- **Intuitive "Point and Shoot" File Selection**
- **Extremely Fast Operation**
- **Command Scheduler for Unattended Backups**
- **Completely Novell Compatible, NetWare 286 and 386, Backup from a node**
- **NetWare Lite peer to peer network compatible**
- **LanTastic network compatible**
- **Logging options for Status Reports**
  - Backup
  - Verify
  - Restore
- **On Line Indexing for Fast File Restore**
- **Easy Master Index Creation and Maintenance**
- **Dynamically Updated Backup/Restore/Verify Status Screen**
- **SCSITEST routine for easy Hardware Diagnosis**
- **Customized Colors for User Preference**
- **Restoration to Different Directories or Drives**
- **Batch File Support for Ease of Use**
- **Hardware Data Compression Compatible**
- **Format Tape Utilities**
- **Quick File Access support for 4mm DAT, 8mm and 1/4" Tape Drives**
- **Parallel to SCSI connections available for Notebook computers**
- **Stacker Support allowing:**
  - A Tape per Server
  - A Tape per Day
  - Eject at End of Job
- **Cascading Data Sets for Stacker or Multiple Tape Drive Support**

MS DOS
DR DOS
OS/2
NOVELL
and coming soon:
NovaRack Windows

Your Authorized NovaStor Dealer

NovaWare Software - Software for the Information Age

Ask about other NovaStor Software products - From the people who know tape!

NovaStor Corporation 30961 Agoura Rd., Suite 109 Westlake Village, CA 91361 Phone (818)707-9900 Fax (818)707-9902

NovaBack

NovaBack

Tape Backup / Restore

• 4mm DAT • 8mm Tape Drives • 1/4" Tape Drives • 9 Track • 3480 Compatible •

NovaBack, the Ultimate in Tape Backup/Restore software, is the proven protection plan for your personal computer, notebook computer, or company LAN.

It's simple to use, easily menu driven with a mouse or keyboard, or set up using powerful batch files defined by the Network Administrator. Backup and restore with selection criteria such as wildcards, names, dates, and more, meaning customized applications to truly suit your needs.

With Unattended Backup, the command scheduler backs up your system without you even thinking about it, offering safety and peace of mind.

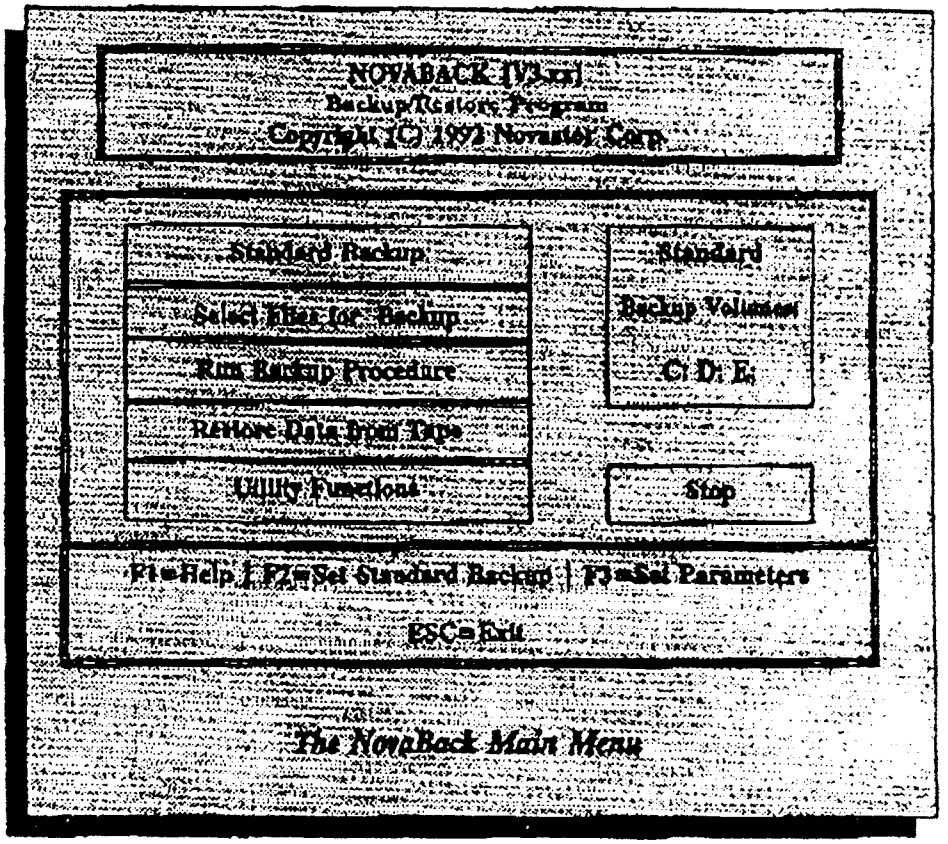
NovaBack is fully NOVELL COMPATIBLE, including the backup and restoration of important Bindery files and Trustee Rights.

If you want safety and security combined with flexibility and ease of use in your tape drive software, don't just back it up, NovaBack it.

NovaBack software supports SCSI and QIC-36 tape drives, and is compatible with a large selection of the most popular SCSI Controller Cards, giving you great flexibility in hardware selection.

NovaBack's implementation of Quick File Access (QFA) means access to any single file in less than 60 Seconds, freeing up your valuable time. NovaBack also includes Stack Loader support, enabling transfers anywhere from 1 byte to 80 gigabytes of data.

Since it isn't drive specific, as your needs change and grow, NovaBack will be there for you.



The NovaBack Main Menu

Quick. Simple. Peace of Mind.

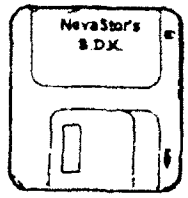
NovaWare Software • Software for the Information Age

Ask about other NovaStor Software products - From the people who know tape!

Software Developer's Kit
4mm DAT, 8mm, 1/4", 9 Track, 3480 Compatible

NovaStor's SDK

NovaStor Corporation's S.D.K. (Software Developer's Kit) is a complete set of modules set up for easy access and control of your SCSI tape drive through custom programs in the C language. Modules and features include:



◆ **The PS/2 Register Interface**

- DIP Switch Settings
- I/O Port Assignments
- Interrupt Logic
- SCSI Read/Write Commands
- ROM Location
- RAM Buffer Operation
- SCSI Write Commands

◆ **The PS/2 Register Interface**

- Micro Channel setup
- Interrupt Logic
- Data Transfer

◆ **ROM Code Interface**

- ROM Code Location & Linking Routines
- BIOS Service Routines and Application Notes

Designing Customized Applications for Your Needs - The Power of Tape

◆ **The S.D.K. Interface and the TDMALL Module -**

- Scan SCSI Bus for Tape Devices
- Acquire Memory Buffer
- Return DOS Memory
- Read and Write Tape Blocks and Tape Marks
- Test Unit Ready
- Start and Continue Multitasking Write and Read
- Initialize the Interface
- Release Dynamic Buffers
- Space & Rewind Tape
- Long Block Tape Read
- Environment Variables
- Link Application Programs
- Error Retries

◆ **The S.D.K. Interface to HTCMOD Module**

- Open a Tape for Read/Write
- Get Tape Block
- Close a Tape Sequence
- End of Output Tape Volume Processing
- Write Tape Marks
- Linking Modules
- Initializing the Interface
- Put a Tape Block
- Space the Tape
- Header File
- Application Notes

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APPENDIX H

COSTING

MPN COST ESTIMATES

The owners of the platform enclosed a cost statement for the use of the platform (in Dutch). Following is a translation of this enclosure and an estimate of the total costs of the platform that have to be paid by the participants of the MAPTIP trial.

Travel:

- Ship (round trip) - ƒ 1,881.50 [1]
- Helicopter (round trip) - ƒ 2,575.80

The capacity of the helicopter is limited to 10 passengers[2] (without luggage). The helicopter will stay on the platform for 1 hour without additional costs.

Personnel:

- Cook	(per day)	- ƒ 971.70
- Steward	(per day)	- ƒ 971.70 [3]
- Manager	(first 8 hours on working days)	- ƒ 379.20
	(7 extra hours on working days)	- ƒ 474.00 [4]
	(saturdays)	- ƒ 1,244.25
	(sundays and holidays)	- ƒ 1,422.00
- Food and lodging	(per person)	- ƒ 48.88

When the platform is continuously operated for a period of more than five days, the platform manager will be exchanged. The travel costs (that is, helicopter or ship, depending on weather conditions) will be charged to the users of the platform.

Per diem for users (scientists and technicians):

- Food and lodging (per day, per person) - ƒ 48.88 [5]

---

[1] prices in Dutch florins, VAT included

[2] 10 persons according to the owners. The platform manager thinks the actual capacity closer to 8 persons.

[3] steward required only if ≥ 7 scientists on the platform

[4] extra hours are charged whenever the manager spends a full working day on the platform

[5] Lodging includes a berth (sheets, blankets and two towels), meals and drinks (to limits at the discretion of the platform manager). Each cabin has a bassin; there are two showers on the platform. Meals are served at prearranged times (in two groups if the platform is fully occupied.

DECLARATION

Dear Sir:

Having taken notice of the MAPTIP work plan and being fully aware the expected financial support from NATO and ONR are probably insufficient to cover all logistics costs involved in this project and recognizing the importance of the project, we hereby declare that (name of your institute) is willing to pay on first demand of the TNO Physics and Electronics Laboratory an equal share in the "uncovered" logistics costs of the MAPTIP project up to a maximum of _____ DFl.

Name
Affiliation
Position
Signature

APPENDIX I

MAPTIP PARTICIPATION LIST

MAPTIP PARTICIPATION LIST

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